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ORIGINAL ARTICLES

What Is Abnormal Psychology — Arthur Ernest Davies 117
The Efficiency of Short Psychoanalyses — Raymond B. Willoughby 129
Variation in Hypersuggestibility Preceding, During and Following the Hypnotic Trance — Robert G. Krueger 131
Effect of Various Factors on Militarism-Pacifism — D. D. Droba 141
The Interval Consistency of the Allports' Ascendance-Submission Test (Form for Men) — Charles E. A. Wang 154
Behavioristic Aspect of Hypnotism — Agnes A. Kemper 163
A Study of Hypnotic Susceptibility in Relation to Personality Traits — Lawrence W. Davis and Richard W. Husband 175
Deception: A Study in Forensic Psychology — Harold Magee 188
The Limitations of Psychometrics in Clinical Practice — Harry W. Crane 190
Color Preference in the Insane — S. R. Katz 202
The Relation of the Knee Jerk and Standing Steadiness to Nervous Instability — Mary A. [illegible] 213

NEW BOOKS RECEIVED 2[illegible]

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THE JOURNAL OF
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WHAT IS ABNORMAL PSYCHOLOGY

By ARTHUR ERNEST DAVIES
LONDON, ENGLAND

"THE conception of our science of psychology", Janet[1] remarks, "is being gradually changed by the attempt to put it to practice. The first attempts at psychotherapy have aroused psychology and rudely called it back to the issue. . . . It is the needs of therapeutic application that are to-day forcing psychology to enter into the study that is proper to it, the description and explanation of human conduct. . . . Medicine has made a sudden appeal to psychology and has asked it to render services for which it was not at all prepared. It has been shown inadequate for its task and this is what has cast discredit on psychotherapy itself. But this failure has forced it to undertake new studies from entirely different points of view, and this has brought about its regeneration."

It is, of course, of recent scientific psychology, of the psychology of the past quarter of a century, that Janet takes this hopeful view. How many of the new studies which psychology has undertaken in this period are due, as he says, to the Macedonian cry of the psychiatrists, and how many to other causes, need not concern us. It is, however, clearly advantageous both for psychiatry and for psychology that so emphatic a recognition is given by one who occupies as prominent a position as does Janet of the services that psychology can render to the study of disordered behavior. Nevertheless, this recognition leads us but a little way, and it may even be a serious impediment, if it produces too confident an assurance in psychiatrist or psychologist that the

[1] Principles of Psychotherapy, pp. 312–313.

simple and elementary difficulties that surround the rendering of this service have been removed, or if it is taken to mean that there exists a clear conception of what these services exactly are.

In other papers,[2] I have indicated that the existing relations of psychiatry and psychology are not satisfactory and that a clearer understanding must be reached before a working alliance can be said to exist between them. One of the outstanding obstacles to this end is the absence of a common agreement of opinion particularly as to how the psychiatric and psychological interests in disordered behavior are to be differentiated. It may be of some service in this situation if, in this paper, an attempt is made to outline the range of studies that are comprised in abnormal psychology, and to ask what its presuppositions are.

Abnormal psychology, is, of course, in the first place, psychology; that is to say, it is based on the facts and relations that are fundamental to all human behavior, normal or abnormal. I think this conception of abnormal psychology as the study of the manifestation under special conditions of the organic and mental processes that are characteristic of normal behavior, has generally been held by psychologists. But the history of psychiatry would lead us to infer that this position was not always held by the alienist, for whom, sometimes, there seems still to exist in profoundly disturbed mental states some mysterious and even mystic element. This view is, however, passing out of favor and I believe that the majority of psychiatrists would find it possible to accept the general statement in which I have summarized the psychologists' standpoint, although some would, perhaps, not agree as to what the facts and relations are which must be regarded as fundamental to human behavior. It is much to be able to start with this as common ground, and to be able to refer to the works of Dr. Bernard Hart in which the psychologists' view is maintained. When, for example, he defines insanity as either an exaggeration or a distortion of the normal processes of the mind, he is signalizing a general contribution of psychology to psychiatry. Even though the doctors are not always aware of the implications of this position, it is a considerable gain that it is expounded by and recommended to the psychiatrists by so eminent a member of their own profession.

Because of its bearing on what is said below, I may point out that any attempt to study disordered behavior is doomed from the start to failure unless it is preceded by a study of what is generally recognized as normal behavior. This is true, whatever

[2] "The Training of Psychologists" and "Psychometry, Psychology, and Psychiatry," this JOURNAL.

the view one holds as to the factors that enter into human behavior. These factors may be of one kind, as the neurologist and behavioristic psychologist maintain, or of two, as some psychiatrists and the majority of psychologists hold; but a knowledge, in the former case, of normal organic physiology, and in the latter, a knowledge also, in Dr. Carpenter's term, of normal "mental physiology", is the only basis on which respectively either can proceed to a successful study of abnormal behavior. In his study of the common physical disorders, the physician is well aware of this requirement; and if he seems sometimes not to be conscious of it in his diagnosis of mental disorder, this must be attributed not to his ignorance of the principle, but to a defect in his fundamental educational qualifications for practice in this branch of medicine. Acquaintance with the normal structures and functions of the mind is certainly as necessary as acquaintance with the normal structures and functions of the physical organism.

Abnormal psychology is, in the second place, a special branch of pathology, and may be defined as the science of mental disorder. For the psychologist it is not possible to draw an exact line between psychological and physiological functions; neuropathic disorders he would regard as an expression of the whole organism. If this is understood, the ground of much disagreement is removed, and jealousies over what belongs to psychology and what to psychiatry have no food on which to flourish. For both psychiatrist and psychologist, mental disorders are psychophysical disorders in which the mental and physical factors belong, in different cases, sometimes to the primary or diagnostic symptoms and sometimes to the subordinate or accessory symptoms. In the clinical picture they are always present together, and what meaning the mental symptoms have depends upon whether there is available, as there is where physical symptoms are concerned, a systematic pathology to which the clinician can appeal to give his diagnosis scientific precision. This field of mental pathology is the special subject-matter of abnormal psychology.

To make this view more explicit, it may be said that abnormal psychology is the scientific study of the morbid mental phenomena which, either as cause or effect, are involved in the disturbances of behavior (symptoms) that constitute the clinical picture of psychiatric disorders. This definition runs parallel with that of physical pathology, which is the scientific study of the morbid physical phenomena which, either as cause or effect, are involved in the disturbances of behavior (symptoms) that constitute the clinical picture of non-psychiatric disorders. It is necessary to be clear about the facts which the important terms of these defini-

tions denote. These terms, "clinical picture", "disturbances of behavior (symptoms)", "morbid mental and physical phenomena", have a definite significance for the medically trained mind, and, in the absence of this training, the psychologist has often failed to understand what the relation of his science is to medicine, and to define it in a scientifically fruitful way.

The term "clinical picture" is the "diagnosis" which ends the physician's examination of his patient, lobar pneumonia or general paralysis, as the case may be. The diagnosis is completed when the physician can give to the clinical picture the name of one of the medical categories in which diseases are classified, or, when it falls outside these, can use a designation or descriptive phrase for this purpose. In either event, it means that certain definite conditions exist and that these conditions are denoted by the diagnostic name that has been given to them.

The term "disturbances of behavior" is an extended form of the medically recognized term "symptoms." The former and less technical term is justified by the fact that in practice "symptoms" tend to shrink to include only or mainly those disturbances of mental and physical phenomena (alterations in any of the structures or functions of the organism) which are most directly connected with the diagnosis the physician is gradually reaching. At the beginning of the examination, every disordered structure and function is listed as a symptom, at its close only certain of them have medical importance. It is necessary to bear this in mind because it does not at all follow that the psychologist can take the same liberty with these phenomena or value them in exactly the same way as the physician.

The term "morbid mental phenomena" denotes the pathology which underlies and gives rise to "symptoms". In medicine this distinction between morbid phenomena (pathology) and symptoms is well known; symptoms are clinically observable conditions, and pathology, the morbid phenomena underlying symptoms. Thus fever, a clinically observed condition in a number of different diseases, is a symptom; and its pathology consists of wide-spread morbid changes in the blood, muscles, heart, spleen, liver, kidney, and lungs. But these morbid phenomena, as all pathology must be, were determined in the first place by experimental laboratory, that is, scientific not clinical, methods. It is knowledge of these morbid phenomena, or scientific pathology that gives to the diagnosis and treatment of physical diseases the definiteness and precision they possess. If we are to get away from the uncertainty that besets existing methods of the diagnosis and treatment of psychiatric disorders, the morbid mental phenomena underlying

mental symptoms must be determined. But this cannot be done in the consulting room or clinic. It requires, as in physical disorders, the development of an experimental laboratory technique which breaks up the symptoms into a series of minute changes which gives to the symptoms a precise signification and a definite denotation.

The justification for stating the denotative uses of these terms is that it is necessary for the psychologist whose special field of work brings him in contact with abnormal phenomena to be familiar with the problems of the consulting room or clinic, and to know something about the established routines of medical examination. The physician, beginning with what the patient complains of, takes these complaints as clues which he follows up until he is able to determine a number of "symptoms" which, by a selective process, he constructs into a clinical picture; and he gives to this symptom-complex the name by which the disease from which the patient is suffering is described. This name when heard by any other medically qualified person calls up the same group of symptoms combined in the same way. None of this is any part of the business of the psychologist; all of it presupposes a medical education and experience. But while this is true, it is a procedure with which the psychologist should be intelligently familiar since, as I hope to show, he can only, or perhaps best, define the nature and limits of his own investigations in relation to it.

Intelligent observation and understanding of medical procedures is possible only if we remember that therapeutics, not diagnosis, is the objective of medical practice, and that the effect of this aim upon all that leads up to it is to determine not only the knowledge that is necessary, but also the form this knowledge must take. For this reason, the clinical method requires the physician to identify symptoms, to add symptom to symptom until they fall into a coherent pattern, and to deal therapeutically with the morbid entity that has been defined in this form. The method, as we see, is mainly synthetic; and the therapeutic purpose requires that an attempt be made to change the symptom-complex into simpler and simpler forms until the gravity of the disease is greatly modified or is entirely overcome in the restoration of the patient to his normal condition.

The psychologist's contact with the work of the physician is at the point where the symptoms of the disorder have been determined before they are reduced to the limited numbr that is characteristic of a particular disease. The psychologist does not regard, and for the purposes of his science cannot regard, one symptom

or set of symptoms as more important than another; all determined symptoms are for him on the same level. For example, there may occur what are called "secondary symptoms," that is, symptoms which are present as a consequence of the presence of other symptoms and which disappear when those on which they depend disappear. Medically, these may be of only subordinate importance, but psychologically we cannot say this, and, indeed, the reverse may turn out to be true. The psychologist, then, begins with the total list of "symptoms"; but it is necessary to warn both him and the psychiatrist that "symptoms" are never to be taken as synonymous with the lists of aches and pains, the depressions and fatigues of which the patient complains. These, as I have said, are rather clues to symptoms which the physician can define only by employing the developed techniques of medical practice in his systematic examination of the patient. The symptoms that have been determined by such means constitute for the psychologist the material from which, when studied by the experimental methods of science, a mental pathology may be built up.

In the light of these explanations, the definition of abnormal psychology given above should be clearly intelligible; what the definition points out is that it is the scientific investigation of the morbid processes that are involved in the symptomatology of mental and nervous diseases that is the problem of the abnormal psychologist.

Following the example of books on physical pathology, abnormal psychology, defined as the science of morbid mental phenomena, may be divided into two main sections, one dealing with general mental pathology, the other with special mental pathology. The object of each is to determine the minute lesions which, as I have said, mask themselves in the form of symptoms, but each has a particular differentia within the class or genus, abnormal psychology, to which they both belong. It is necessary therefore only to point out these differentiae in order to show the range of studies comprised in abnormal psychology.

General mental pathology may be defined as that branch of abnormal psychology which studies the morbid mental phenomena which, either as cause or effect, are involved in disturbances of behavior, and which may occur in any of a number of psychiatric conditions. It will be observed that general mental pathology is therefore analogous to general physical pathology which studies, for example, the changes which normal tissue undergoes when an inflammation is set up, or, again, the processes of repair when a tissue is injured, without caring, for the purposes of this science, whether these conditions exist in this or that tissue, or whether

they are produced by this or that agent. A similar state of affairs confronts abnormal psychology, since the psychiatrist has observed that a number of morbid mental states are common to different mental disorders and are induced by different environmental conditions. Some of the symptoms that have been observed in mental diseases which, so far as our knowledge at present extends, are different, are: ties, hallucinations, delusions, flight of ideas, dreams, euphoria, dysphoria, aboulia, phobia, etc. These phenomena are of interest both to the psychiatrist and to the abnormal psychologist. For the former, they are symptoms which guide him to his diagnosis and to the course of treatment by which he hopes to get rid of them; for the latter, they are complex abnormal states which require analysis if light is to be shed upon their nature and cause.

If a survey is made of what the psychologist has contributed to our understanding of abnormal behavior, two interesting facts come to light. The first is that the subjects that have engaged his attention chiefly are those that belong to the field of general mental pathology. There is a special reason for this in the fact that, occurring in a number of different disorders, the morbid phenomena here in question also appear in simpler forms in individuals who have not come under medical supervision. Anyone, therefore, who is interested in divergences and peculiarities of behavior will not find it difficult to meet with this material; and the qualified psychologist will naturally be attracted by it, and be led to extend his acquaintance with and knowledge of it by ascertaining what others have written about these phenomena. The second fact is that when psychologists come to write systematically about mental deviations, they are content for the most part to provide a digest of what physicians have said before them, leaving their readers to suppose that because the material is mental any responsible statement about it is, therefore, psychology. What we miss in these books and papers is a serious attempt to go behind the physicians' descriptions of disease and the theories they have constructed for their own guidance in medically dealing with them. It is chiefly because abnormal psychology has taken on this character that it has become almost entirely an academic subject, requiring of its students only the ability to make a recitation on the assignment for the hour, and inducing teachers of such courses to believe that their own mastery of this material adequately qualifies them to diagnose and treat psychiatric disorders.

Special mental pathology, on the other hand, may be defined as that branch of abnormal psychology which studies the morbid mental phenomena which, either as cause or effect, are involved

in the disturbances of behavior, and which occur only in a particular psychiatric condition. Thus it has a purpose similar to that of special physical pathology, namely, to determine the gross and microscopic lesions that are idiopathic to individual disorders. The special pathology of mental diseases has been, for the most part, studied by neurological psychiatrists who have here made use of the techniques of microscopic anatomy. They have sought, for example, to connect the symptomatology of dementia praecox with degenerative changes in the large pyramidal cells in the third layer of the cortex, and some also, with demonstrable changes in the testicular cells. What has been done, in this way, for the physical pathology must be done for the mental, if an adequate pathology of particular psychiatric disorders is to be made available to the physician. The conditions required by the two lines of investigation are not very different, and, in the one case as in the other, an acquaintance with the methods by which normal structures and functions are studied is necessarily presupposed. It is for this reason that I have insisted either that the psychiatrist must be trained in the methods and results of experimental psychology, or that the psychologist must receive the training sufficient to enable him to understand the medical problems involved.

An indication of how the problems of special mental pathology can be approached may be had by glancing over my paper on "An interpretation of the mental symptoms of dementia praecox",[3] where it will be seen that the symptomatology of this disease is analyzed into changes in the character and relations of processes which are present in normal behavior. This paper is only a first report of what it is possible by psychological analysis to do in this disease, and a similar service might profitably be undertaken for other well known and described diseases. If this were done, we should be at the beginning of a scientific mental pathology; to carry it further than this, however, would require that patients suffering from these diseases be made as freely available to the psychologist who undertakes their study, as they are now to the psychiatrist who undertakes their cure.

To summarize: Abnormal psychology is the scientific study of the mental pathology that underlies the symptomatology of psychiatric diseases. It is (1) general, when the symptoms studied are common to a number of diseases; and (2) special, when the symptoms studied are idiopathic to particular diseases.

[3] This JOURNAL, October–December, 1926.

THE EFFICIENCY OF SHORT PSYCHOANALYSES

By RAYMOND R. WILLOUGHBY

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PSYCHOANALYSIS (using the word generically, to include techniques presumably dependent upon the same fundamental psychic dynamics) appears to be the only method of emotional reëducation which has yielded clinically satisfactory results; as such, it takes rank as an instrument of major importance for the reorganization and attainment of social values, and like all such instruments, should be subjected to quantitative study as rapidly as methods for such study can be devised. Pending the outcome of such fundamental approaches as those of Dunlap and Lewin to this problem, there are a number of practical problems which are so pressing as to justify (in the absence of more satisfactory data) the presentation of frankly subjective estimates in lieu of measurements. One of the most obvious of these is that of the proportion of cases treated resulting in improvement and the degree of that improvement; it is in the hope of putting some sort of record, however crude, into this very important but evidently untouched field that the writer presents estimates on sixteen cases seen by him between July, 1928, and August, 1930. Since circumstances out of the control of both patient and analyst prevented most of these from running an adequate time, some impression may also be gained on the problem of the usefulness of short analyses, a problem often of considerable practical importance; two or three cases seen two or three hours for exploratory purposes have been excluded, and the minimum set arbitrarily at five hours.

Clear thinking in this field is conditioned upon some scrutiny of the variable or continuum in which "improvement" takes place. Since this leads directly into many unsolved problems, still only qualitatively attacked, concerning the dynamics of cure, an assumption must be invoked here, and such an assumption as will lead to the possibility of quantitative estimate. Let us assume (as is probably implicit in the formulations of the systematic psychoanalysts) that the amount of emotional energy ("libido") at the disposal of the personality is approximately constant, and that it is capable, largely automatically and involuntarily ("uncon-

sciously") of entering into dynamic or energizing relationships with ("cathecting") various objects, including the self ("ego"). Notwithstanding the panic frequently aroused in academic circles by the special terminology, the concept is no more mystical than, though perhaps as mysterious as, that of the amount of physiological energy at the disposal of a small boy entering into an energizing relationship with a bat and ball. If then we examine the factor of self-cathexis, we may observe that its proportion to the whole amount of energy available exhibits interesting changes; in early childhood, for instance, it is normally a very large part of the whole, and only gradually through the vicissitudes of parental attachment, selection of a sex object, vocational expression and parenthood does it achieve relative detachment from the ego and redirection into externally directed channels; the schizophrenic and the depressed cyclophrenic show an extreme degree of self-cathexis in a clear form; the hysteric and obsessional offer the same symptom in disguised form; the manic cyclophrenic presents the extreme lack of self-cathexis. For the purposes, then, of this essentially exploratory and practical discussion, we may consider the process of cure to consist of progressive loosening of energy attachments to the self and making them available for reattachment to external objects. "Resistance" would then be resistance to the loosening process, which itself would consist in exposing the attachments to the disintegrating action of opposed motives ("bringing the unconscious to consciousness"); and "transference" would be the temporary attachment of energy to an intermediary.

By neglecting the case of the manic, who does not appear in the actual series of sixteen cases, we may somewhat simplify the scale under discussion; the zero point, in any event, will be represented by the regressed schizophrenic—for example, the patient who cannot detach sufficient energy from his ego to enter into effective relationships with food; the hundred per cent point will be represented by a largely hypothetical individual all of whose emotional energy is available for controlled, "sublimated" effort in the external world; the fifty per cent point will be the appropriate location of an individual half of whose energies are directed toward unsublimated ego satisfactions; etc. The "just noticeable difference" on such a scale is of course also a subjective matter; it may be placed arbitrarily at ten per cent.

In the accompanying chart males are represented by heavy, females by light lines; the broken line (Subject I) represents change continuing after the expiration of formal analytic work.

The rectilinearity of the lines is not of course intended to convey any implication of uniformity of process; the major and minor cataclysms characteristic of certain stages of analysis might be thought of on the foregoing schema as the temporarily uncontrolled dissipation of quanta of energy loosened from old attachments and not yet attached to new.

A rough estimate of efficiency in the physical sense may be made from the above data by dividing the degree of improvement by the time spent; the total improvement divided by the total times

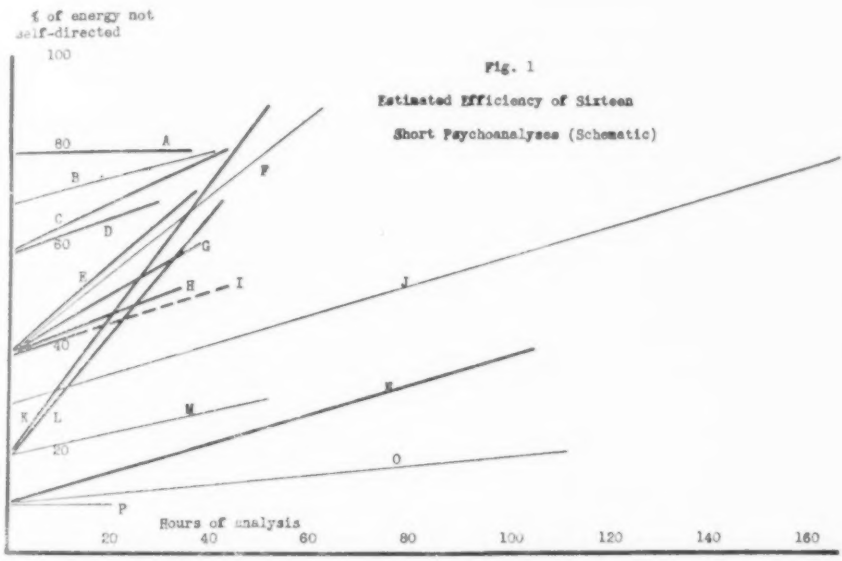

Fig. 1

Estimated Efficiency of Sixteen Short Psychoanalyses (Schematic)

gives .45 per cent per hour as an estimate of the general efficiency. The individual figures are not given, since they correspond to the slopes of the lines on the chart. They may perhaps permit certain generalizations, subject to the considerable limitations of the method of estimate:

(1) Psychoanalyses of thirty to sixty hours, while obviously unsatisfactory, may yet be decidedly worth attempting, particularly in view of the possibility of "maturation" after the formal termination of the work.

(2) Women are likely to be decidedly poorer "risks" than men (subjects M, O, P); this appears to be connected with the early initiated and constantly sustained training in auto- and hetero-deception imposed upon them in our culture.

(3) The third decade is probably the optimum period for this form of reëducation (Subjects E, F, J, K, L); intellectual powers are at their

peak; contacts with basic problems have been sufficient to develop a strong consciousness of the location and importance of the zones of weakness; and cathexes have not been so firmly set as to make their detachment and redirection impossibly difficult. Age in excess of about forty-five constitutes a grave handicap (Subject O).

The following specific observations, not derivable from the chart but observed clinically, may be worth recording in connection with this series of cases:

(1) Compensatory scrupulousness, dependability and consuming desire to "make good" based on parent fixations and anxieties form an excellent indication for psychoanalysis. Coöperation is likely to be excellent; the "survival value" of the trait is not likely to be affected, and the individual may be made very much more comfortable and even more successful objectively, since a trait annoying to superiors and associates is modified. Maturation in the case observed (Subject I) was very great in proportion to the time spent.

(2) Homosexuality, because of the initial transference set-up, ordinarily offers an excellent prognosis in a patient of the same sex as the analyst (Subjects E, K, L) and a very poor prognosis in the opposite sex (Subject O, traces), in whom, indeed, it will rarely be seen. This applies to unconscious (*e.g.*, paranoid) trends based on homosexuality (based in turn on anomalous resolutions of parent attachments) as well as to overt forms.

(3) The so-called psychopathic personality (Subject N) is among the most difficult, but also the most interesting and important, types seen. He is probably chiefly male, a nomad, a potential or actual criminal, weak, fearful (perhaps compensated), desperate, incompetent (although frequently of good native ability), shifty, parasitic, and at once grateful and vindictive toward proffered assistance. His therapy involves long periods of time (possibly fractionated), extraordinary delicacy in the handling of the early phases, the delegation of normal responsibility as fast as it can be assumed, a modicum of reassurance and encouragement and even of occasional interference in important decisions, prevention of escape tendencies, and particularly constant encouragement to the (verbal) expression of whatever hostile impulses appear in consciousness. Structurally he appears to be the result of a resolution at a very early period of the parent attachments on the basis of intense and deep-seated hostility, and on that basis also he is likely to show homosexual trends.

(4) Kleptomanic impulses, overt or concealed, are to be expected in association with any history of deprivation or suppression of normal affective interchange with parents (Subjects E, I, O); the object stolen is usually symbolic of the withheld affection, a symbolism often eloquently expressed by the glaring lack of any adequate economic motive.

(5) Radical, revolutionary, resentful or trouble-making tendencies (Subject C) commonly refer back to arrested attempts to dissolve the

parent attachments. The association with homosexuality is uncertain, but may depend upon the sex of the parent critical in the individual situation.

(6) Hysteroid pictures, contrary to the usual experience, were found to be extraordinarily resistant, overwhelming the individual with formations bearing not a little of the character of systematized delusions (Subject O); it is possible that this finding must be discounted for the fact that the most striking representatives were females in middle life.

(7) The value of hypnosis is uncertain; it was used only in obstinate cases where remaining time was short (Subjects J, N). There seems no doubt that the hypnotized patient has access to material hidden while awake, but it is not certain that its assimilation is affected favorably or otherwise. The deepest material, as in waking, emerges not as a clear recollection, but as hypothesis, peculiarly toned setting without event, etc.

(8) Motive is all-important; analyses undertaken out of intellectual curiosity, or for an inadequate fee, or in the conviction that the analyst is being paid to do something to the ((passive) patient, or that have been offered on any basis by the analyst to the patient, may be expected to yield slight returns (Subjects H, M, O, P). The motive promising the best results is a considerable degree of mental distress, short of disorganization but beyond discomfort (Subjects D, E, K, L).

(9) The rôle of intelligence was not found to be so great as is usually described; although the series contained several persons well inside the top percentile in mental ability, two of the most effective analyses (Subjects K, L) were of individuals of approximately average intelligence; these, it may be mentioned, possessed strong motivation.

(10) *Ceteris paribus*, a religious sublimation (frequently a disguise rather than a genuine sublimation) is to be regarded as unfavorable (Subjects A, C, G, H). This mechanism is likely to be part of a rather definite and fairly frequent constellation, viz., obstinacy ("anal erotism"), attachment to the mother (in men—it is doubtful whether the same organization occurs in women), homosexuality (connected with the obstinacy and based on the mother fixation—fear of other women), and a need both to dominate and to be dominated (aspects of the mother fixation). The difficulty arises from the obstinacy and from the marked resistance arising from the homosexual repressions, and is peculiarly effective in that these persons are likely to be highly capable intellectually and that they have been furnished with a highly subtle set of rationalizations elaborated over hundreds of years for the very purpose of maintaining these same repressions.

(11) The extraordinary misreadings and incomprehensions of the psychoanalytic position with which newly published standard textbooks of psychology continue to abound make desirable a brief record of reaction on the part played by sexual material in these cases. This part is no small one. Repeated experience of the fact that not until old parent-child rôles are played out and begin to convert themselves into new subject-object rôles does a favorable personality change begin to show up, breeds what it would breed in any other connection, *viz.*, the conviction of a causal relation and the suspicion that when neither sexual material nor person-

ality change appears the conscious or unconscious withholding of the one is preventing the appearance of the other. The impression left by these eight hundred-odd hours of observation is that the most fateful problem in life is the resolution of the parent attachments, and that the language in which this drama is played out is largely sexual; that it may not be entirely so is indicated by such facts as that in kleptomania the stolen object commonly represents the withheld parental love—evidently an acquisitive rather than a sexual symbolism, at least superficially (in this series there is no evidence either for or against the Freudian finding as to the contents of the maternal body). An example from each sex will be representative of a numerous array: The analyst at a certain period comes to receive feelings of trust, dependence, admiration, etc. ("positive transfer"); in conventional language this might be expressed "You give me all I need"; using the language of symbols, the girl ceases to smoke—*i.e.*, "You impregnate me sufficiently—I need no other"; the man ceases to masturbate—"You give me all the outlet I need." It is not especially strange that the symbols should have this erotic coloring and no other; given the facts—hunger and sex the only deep and ancient drives, hunger fairly regularly and completely satisfied, sex infrequently or never so—it would be hard to find any other possible medium for them. Neither is it particularly alarming; to express the variety of one's relationships and vicissitudes in terms of one deep human preoccupation rather than another or several others has no more ultimate ethical import than to have had German for a mother tongue instead of English or Chinese. As the important matter is what is said in German, English or Chinese, so the ethically significant consideration is the social availability of the sexual energy involved, *i.e.*, the proportion of such energy detached from self-cathexes.

VARIATION IN HYPERSUGGESTIBILITY PRECEDING, DURING AND FOLLOWING THE HYPNOTIC TRANCE[1]

By ROBERT G. KRUEGER

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IT has recently been shown experimentally that during the hypnotic trance, the degree of suggestibility is markedly increased.[2] This lends color to the view which has been widely held since the work of Bernheim, that a condition of heightened suggestibility is the essential characteristic of hypnosis. The extent of this hypersuggestibility at the several stages of the hypnotic trance as well as the course of its rise during the process of hypnotization and the mode of its disappearance at the formal termination of the trance, become basic considerations in any scientific approach to the subject. In this connection a number of specific questions arise. During the process of hypnotization, does the hypersuggestibility increase more rapidly at the beginning or during the period just preceding lid closure; *i.e.*, if the curve of increase of hypersuggestibility were plotted, would it be one of positive or negative acceleration? Are subjects in general in the trance at their maximal depth at the moment of lid closure, or does the point of greatest suggestibility come at some later stage in the trance? What is the normal course of the degree of hypersuggestibility as the trance is prolonged beyond the point of its maximal depth? Do the essential characteristics of the trance really vanish with the opening of the eyes at the formal termination of the trance or does it persist despite the suggestion to "awake". Lastly, if the hypersuggestibility really outlasts the formal trance, how long does it survive and does it diminish mainly by a positive or negative acceleration? It was with a view to exploring the several fields of hypnotic hypersuggestibility and to finding preliminary answers to some of the above questions that the present study was undertaken.

In the following account the first or primary trance (including the trance-induction period) is to be understood as one which has been preceded by an interval of at least 24 hours during which

[1] The writer wishes to express his indebtedness to Professor Clark L. Hull for his helpful suggestions and criticisms during the course of the investigation.

[2] C. L. Hull and B. Huse, Comparative Suggestibility in the Trance and Waking States. Amer. J. of Psych., 42, 1930, 279–286.

the subject has not been in a trance. The second or secondary trance period is that which follows a waking period of definite, but comparatively brief, duration which, in turn was preceded by a primary trance. The period between the primary and the secondary trances will be known as the intertrance period.

I

The problem of this part of the investigation is to trace the changes in hypersuggestibility during the process of trance induction and through ten minutes of a quiet trance.

PROCEDURE

In this study it is taken as axiomatic that the more quickly a subject responds to suggestion by the performance of a given act, the more suggestible he is. Fairly widespread observation indicates that if a person is awakened from a hypnotic trance he will go into a second trance shortly after in distinctly less time than would be required 24 hours later. A series of preliminary experiments readily confirmed the results of observation—subjects are evidently in a state of heightened suggestibility immediately after waking from the trance. And, obviously, if the trance-induction time after 24 hours be taken as an index of normal suggestibility, the difference between this and the trance-induction time after 15 seconds, say, would yield a measure of the degree of the subject's hypersuggestibility at the latter time.

But with this measure of hypersuggestibility available we are still in a difficulty when attempting to measure the degree of hypersuggestibility of a subject at the several stages of the trance period. This is because the above technique is based upon the length of time required to go into the hypnotic trance, whereas it is obviously impossible to put a person into a trance when he already is in one. This forces an indirect approach which assumes that if a subject be wakened from a trance state of extreme hypersuggestibility, there should be a greater amount of excess suggestibility persisting after a given brief waking period than if the subject were awakened from a state of relatively slight hypersuggestibility. The degree of residual hypersuggestibility thus shown to persist 15 seconds after waking from the various stages of a 10-minute quiet trance are accordingly employed as indices of the degree of hypersuggestibility in the several trance states. By making in this manner a systematic survey of the hypersuggestibility following typical stages of a particular type of trance

we should secure some light on its characteristic mode of variation if any variation exists.

Six primary trances were employed. One was midway in the trance-induction process, another at the instant the trance was induced (lid closure), and the remaining ones were trance periods of one, two, five, and ten minutes duration, respectively. The intertrance waking period was made as short as possible in order to reduce the loss of hypersuggestibility between the primary and secondary trance periods to a minimum. Fifteen seconds was found to be the shortest practicable period for this purpose since the subjects readjusted themselves in the chair upon waking and time for a readjustment of posture had to be given before a second trance could be satisfactorily induced. Because the waking period is of appreciable length there will be a loss in hypersuggestibility during this period and probably a considerably larger loss due to the process of "waking". The hypersuggestibility as indicated by the secondary trance-induction time will accordingly be too low to be taken as a measure of the absolute trance hypersuggestibility. The general form of the resulting curve should not be seriously affected, however, since the intertrance waking period was maintained at a constant value.

The optical fixation method was used in inducing the trance. The fixation object was a glass rod 25 cm. long and 8 mm. in diameter with a glass sphere 15 mm. in diameter blown at one end. The sphere was filled with mercury which made it an excellent mirror and caused the light to be reflected from a single point upon which the subject fixated.

Lid closure, because of its objectivity, was used as the criterion of the onset of the trance in all cases. The trance induction time was taken as measured from the instant suggestions were begun until the lids closed, except for the period midway in the induction process. In this latter case suggestions were terminated after half of the average trance induction time had expired, and the subject was suggested to awake even though his lids were not closed. A stop watch, one hand of which could be stopped without interference with the remaining one, was used in measuring the time intervals.

The order of the experimental periods was as follows: one-half lid closure (or trance induction) time, one minute, five minutes, ten minutes, two minutes, lid closure time, ten minutes, two minutes, lid closure time, one-half lid closure time, one minute, and five minutes. Thus two measures were obtained for each period from each subject. Half of the four subjects, R and S,

TABLE I

THE ORIGINAL DATA OBTAINED IN DETERMINING THE DEGREE OF HYPERSUGGESTIBILITY DURING THE HYPNOTIC TRANCE AND ITS PERIOD OF INDUCTION

Subject	Cycle	Stage of Trance											
		½ Lid closure time		Lid closure		1-Minute trance		2-Minute trance		5-Minute trance		10-Minute trance	
		First Period	Second Period	First Period	Second Period	First Period	Second Period	First Period	Second Period	First Period	Second Period	First Period	Second Period
R	Primary	17.0	15.0	35.0	22.2	18.0	23.5	33.0	22.0	23.2	21.0	30.0	22.5
	Secondary	19.5	12.5	9.5	10.0	5.5	7.0	8.0	7.8	11.0	9.2	8.0	7.8
H	Primary	13.0	13.0	26.5	27.0	35.0	31.0	26.0	16.0	27.0	17.5	26.0	21.5
	Secondary	17.0	8.5	7.0	10.5	11.0	6.5	11.8	10.0	9.0	6.5	14.0	5.5
S	Primary	9.0	9.5	21.4	8.2	12.0	11.0	17.0	11.0	12.5	11.0	16.0	9.5
	Secondary	8.5	8.6	7.5	4.0	6.0	6.0	12.0	6.2	6.0	6.5	7.5	7.2
W	Primary	24.0	11.0	28.0	20.0	48.0	24.0	35.0	22.0	35.0	15.0	37.0	27.0
	Secondary	26.5	13.0	13.0	8.5	14.0	9.5	17.0	12.0	13.5	8.0	18.0	10.0

were run in the reverse of the above order. In all of the trance periods suggestion was stopped ten seconds after the onset of the trance, the remainder of the trance being quiet. The second trance period was always of one minute duration. A minimum interval of twenty-four hours elapsed between experimental periods in all cases.

All of the subjects used in the experiment were university students. They were obtained from the University Employment Bureau and paid by the hour. All had been previously used in hypnotic experiments so that the effects of practice upon rate of going into the trance were reduced to a minimum.[3]

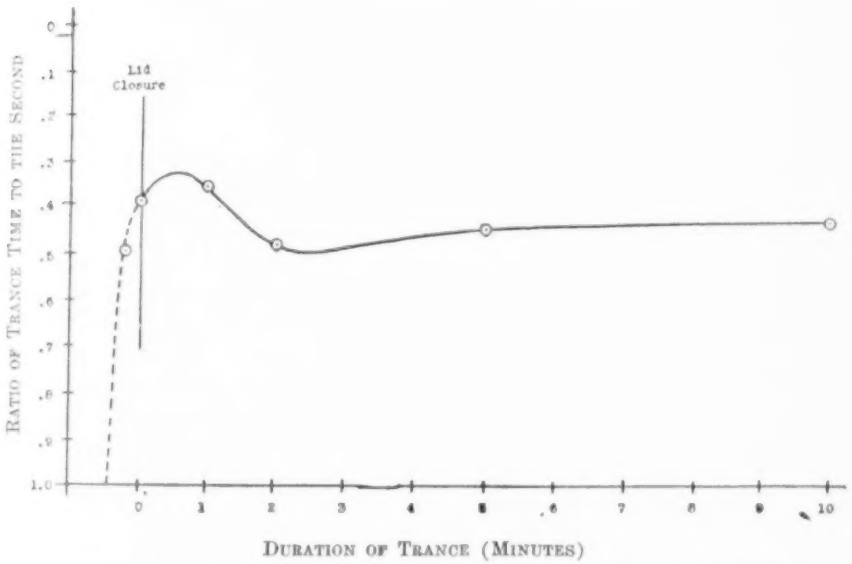

Fig. 1. Graphic representation of hypersuggestibility at a point midway in the process of trance induction and at various periods during the trance.

RESULTS

Table I shows in detail the length of time suggestion was required to induce the primary and secondary trances respectively for the several primary trance periods. Table II shows the average ratios of the primary trance time to the secondary trance time for each cycle under each primary trance condition.

Fig. 1 shows graphically the means of these ratios. The dotted portion of the curve represents the interval between the time when

[3] R. G. Krueger. The Influence of Repetition and Disuse Upon Rate of Hypnotization. J. Exp. Psych. (In press.)

suggestion was begun and the onset of the trance. The first two points of the curve represent the periods, respectively, of one-half the time required for lid closure, and the time required for complete lid closure. The lid-closure values vary somewhat from subject to subject so that the average length of time required for trance induction was used for the abscissa of the second point and one-half that value for the abscissa of the first point. An inspection of Fig. 1 indicates that the extent of hypersuggestibility

TABLE II

SUMMARY OF THE RATIOS DERIVED FROM TABLE I INDICATING VARYING DEGREES OF HYPERSUGGESTIBILITY DURING THE TRANCE AND PRE-TRANCE STATES

Subject	Average Ratio of Primary Trance Time to Secondary Time					
	½-Closure Period	Lid-Closure Period	1-Minute Period	2-Minute Period	5-Minute Period	10-Minute Period
R.....	.491	.372	.302	.298	.456	.307
H.....	.486	.327	.262	.540	.358	.398
S.....	.475	.419	.523	.635	.536	.614
W.....	.567	.445	.344	.516	.460	.429
Mean	.507	.390	.359	.497	.452	.437

reaches its maximum a half minute after the onset of the trance. The curve then shows a rapid fall at the two-minute period, but from there a gradual increase to a second high value at ten minutes. It was anticipated that the suggestibility would fall rather than rise from the two- to the ten-minute period. A statistical analysis of the difference between the values at these points shows that a difference of the size and nature obtained could be produced by the mere accidents of sampling in about one chance in four. This, of course, is much too low for final acceptance.

II

PROCEDURE

In investigating the extent of the hypersuggestibility following the trance, a variable waking period was interposed between a constant primary and secondary trance period. The length of time required to induce the secondary trance as compared with that to induce the primary trance under these conditions should yield a direct measure of the residual hypersuggestibility at the end of the particular waking period. If a series of such determinations should be made at suitable intervals it should be pos-

TABLE III

THE ORIGINAL DATA OBTAINED IN DETERMINING THE DEGREE OF HYPERSUGGESTIBILITY FOLLOWING THE TERMINATION OF THE HYPNOTIC TRANCE

Subject	Cycle	Interval Between Trances (Seconds)											
		5-Second		30-Second		60-Second		5-Minute		20-Minute		60-Minute	
		First Period	Second Period	First Period	Second Period	First Period	Second Period	First Period	Second Period	First Period	Second Period	First Period	Second Period
Wd	Primary	28.0	14.5	22.0	15.5	19.0	16.0	25.0	11.6	18.0	20.0	14.2	13.5
	Secondary	14.0	6.0	4.5	8.8	9.0	6.0	9.0	7.6	9.0	7.0	8.0	10.0
Ws	Primary	41.0	36.0	46.0	45.0	46.0	51.0	55.0	50.0	79.0	47.0	42.0	36.0
	Secondary	15.0	16.0	16.0	22.0	27.0	30.0	30.0	35.0	40.0	29.0	28.0	27.0
R	Primary	12.0	5.0	8.0	7.0	9.0	7.5	12.0	7.0	20.0	8.0	7.0	5.5
	Secondary	5.0	3.5	5.0	3.8	9.0	5.0	7.0	4.5	13.0	4.5	7.0	5.0
P	Primary	16.0	8.2	10.5	6.2	22.0	11.0	19.0	5.6	9.5	7.0	9.0	7.5
	Secondary	9.0	3.8	4.5	3.2	19.0	5.0	10.0	3.0	9.0	5.5	10.0	6.0
T	Primary	48.0	46.0	58.0	48.0	47.0	50.0	44.0	41.0	27.0	54.0	50.0	....
	Secondary	10.0	25.0	13.0	28.0	16.0	55.0	21.0	31.0	37.0	25.0	42.0	....

sible to determine the curve or law of the diminution of hypersuggestibility following the formal termination of the trance.[4]

The general procedure employed in Part II was similar to that employed in Part I, except that the length of the intertrance waking periods, rather than of the primary trance periods, was varied. A two-minute primary, and a one-minute secondary, trance were used with intervening waking periods of five seconds, thirty seconds, one minute, five minutes, twenty minutes and sixty minutes. In order to eliminate a possible time error, the order of the experimental periods was chosen as follows: 5 seconds,

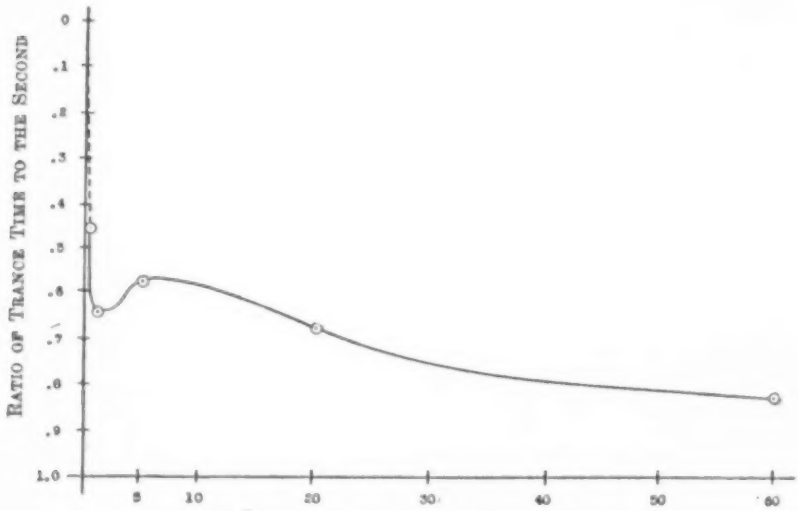

Fig. 2. Graphic representation of the diminution of hypersuggestibility following the termination of the hypnotic trance.

60 seconds, 20 minutes, 60 minutes, 5 minutes, 30 seconds, 60 minutes, 5 minutes, 30 seconds, 5 seconds, 60 seconds, and 20 minutes. In order further to eliminate constant time errors three of the five subjects of this part were run in the above order, and two in the reverse order.

RESULTS

Table III shows the length of time suggestion was required to induce the primary and secondary trances respectively, for the

[4] C. L. Hull. Quantitative Methods of Investigating Hypnotic Suggestions. J. Abn. and Soc. Psych., July, 1930.

several intervening waking periods. Table IV shows the average ratios of the secondary trance time to the primary for each cycle under the variable waking conditions. Fig. 2 represents graphically the average or composite ratios shown in Table IV. In plotting this curve the values for the five- and thirty-second intervals following the trance were combined, because the scale to which the curve was drawn did not readily permit a twenty-five-second distinction. The dotted portion of Fig. 2 is assumed since the shortest waking period was five seconds.

TABLE IV

SUMMARY OF THE RATIOS INDICATING VARYING DEGREES OF HYPERSUGGESTIBILITY FOR PERIODS FOLLOWING THE TERMINATION OF THE HYPNOTIC TRANCE

Subject	Average Ratio of Primary Trance Time to Secondary Trance Time					
	5-Second Interval	30-Second Interval	60-Second Interval	5-Minute Interval	20-Minute Interval	60-Minute Interval
Wd	.457	.387	.422	.508	.425	.647
Ws	.405	.388	.587	.623	.562	.756
R	.600	.605	.833	.613	.607	.955
P	.513	.473	.660	.532	.866	.956
T	.376	.404	.722	.617	.916	.840
Mean	.470	.451	.645	.579	.677	.830

Immediately upon waking from the trance there is indicated a sharp decrease in the hypersuggestibility, followed by a gradual rise with a maximum occurring approximately five minutes after waking. A statistical analysis of this rise indicates that a change as great as this might have resulted from the accidental factors of sampling in about one case in four. This, again, is much too low for final acceptance, though it raises a certain amount of presumption that some such tendency exists. From this point on, the curve shows a gradual decrease until, after a waking period of one hour, only about seventeen per cent of the effect still persists.

SUMMARY

More than half of the hypersuggestibility characteristic of the trance appears to have accumulated by the middle of the hypnotization period, which indicates a curve of negative acceleration.

There is some indication of a variation of hypersuggestibility during the course of a ten-minute quiet trance. The curve shows two maximum points which appear respectively at one and ten minutes after the onset of the trance.

Upon the termination of the trance, under the conditions of the present technique and provided the trance is not too long, the curve shows a clear persistence in hypersuggestibility amounting to about fifty per cent of the trance-state value. The first minimum value occurs approximately two minutes after the termination of the trance. There ensues an increase up to the six- or seven-minute period which is followed by a gradual decrease, presumably until the pre-trance level is reached.

Because of the small number of subjects used, these curves are not to be taken as more than a preliminary indication of their true form.

EFFECT OF VARIOUS FACTORS ON MILITARISM-PACIFISM

By D. D. DROBA

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THE present study is based upon a scale which had been constructed for measuring militarism-pacifism or attitudes toward war and peace. The method of equal appearing intervals was used for this purpose. Construction was based on three hundred students' judgments and resulted in forty-four statements graduated about equally to constitute the scale.[1]

The constructed scale was given, in printed form, to 1,000 students attending the University of Chicago in the Autumn Quarter of 1928. Among the 1,000 students those who indicated their educational status were 289 freshmen, 240 sophomores, 145 juniors, 52 seniors, and 48 graduates. The 784 students who gave their ages ranged from 14 to 58 years with an average age of 20.3 years. The students were representative of a wide range of interests and departments.

If the subject agreed with the sentiment of a statement, he was instructed to mark it with a plus sign. If the subject did not agree with the sentiment of a statement, he was asked to mark it with a minus sign. If the statement seemed to be ambiguous so that he could not decide for or against it, he was instructed to mark it with a question mark.

The scale was administered in some cases by the experimenter, in other cases by the instructor, depending on the practicability of the situation. Most of the instructors were ready to coöperate. The administrator distributed the scale sheets to all the members of the class, explained some of the items in the information section, the graphic scale, and answered any questions that arose.

The giving of the scale took about twenty minutes. In a few cases when students were asked to score their own papers, it took a few minutes longer. Self-scoring was found, however, to be unreliable and later was abandoned. The great majority of the students followed the instruction to the letter. Some of the items in the information section were left unanswered, and in a few cases

[1] An article on the construction of the scale entitled: "A Scale of Militarism-Pacifism" appeared in the *J. of Educ. Psychol.*, 1931, 22, 96–111.

no self-ratings were given. Four per cent of the returns had to be discarded because a number of parentheses were left blank, and one and one-half per cent were discarded because some statements were corrected or commented upon.

Eight hundred students rated themselves on the graphic scale which was found on the bottom of the sheet used for the statement scale. The instructions were as follows: "Please locate your attitude on the scale below: Place an X above the number on the line which you believe represents your position on militarism-pacifism". The Pearson coefficient of correlation was calculated between the scores obtained from the statement scale and the scores obtained from the rating scale, and was found to be +.75.

Scores on the statement scale were studied in relation to fourteen different factors. The factors are as follows: education of students, education of parents, age, sex, expenses, intelligence, personality score, interest, political party, church affiliation, occupation of father, war-service, employment, and nationality of parents. Results are described below.

1. *Education of Students.* Data obtained from 774 students were arranged on the basis of the classification of each student. As a result five groups were obtained in order: freshmen, sophomores, juniors, seniors, and graduates. For each of the classes a mean of the militarism-pacifism scores was then calculated. Table I shows the mean scores together with the standard errors of the means, and the standard deviations of the distributions of the scores.

TABLE I

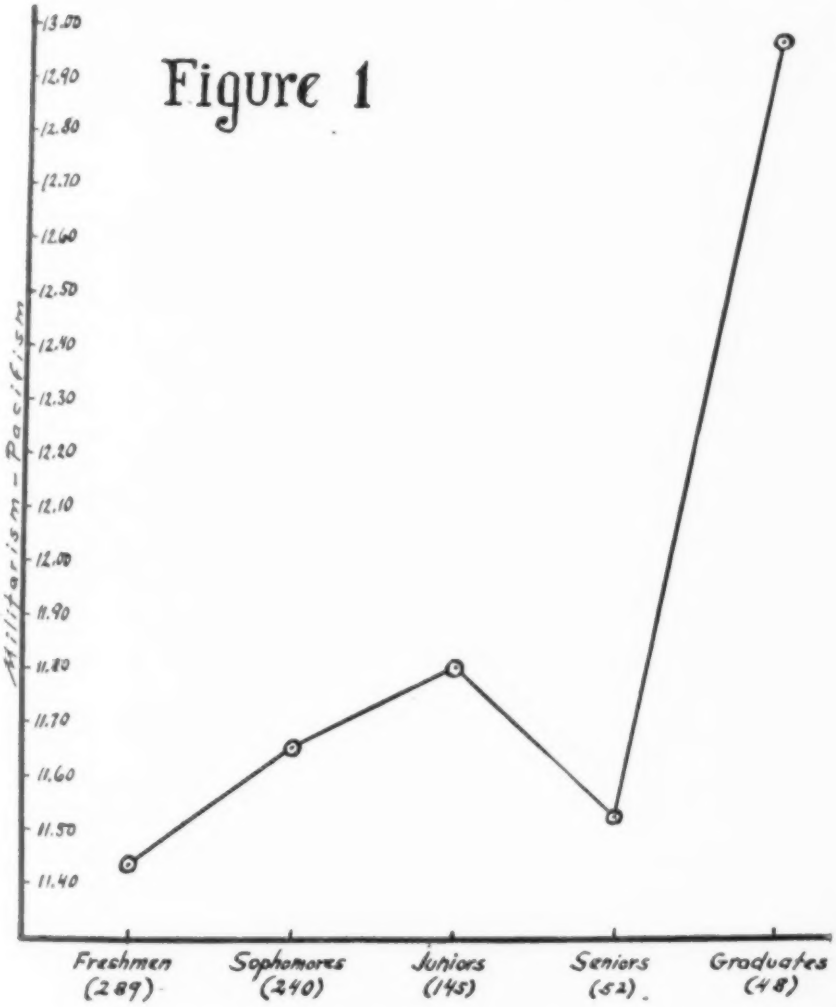
No.	Class	N	Mean Score	σ_m	σ
I	Freshmen	289	11.43	.11	1.98
II	Sophomores	240	11.65	.13	2.09
III	Juniors	145	11.80	.16	1.95
IV	Seniors	52	11.52	.27	1.98
V	Graduates	48	12.97	.28	1.96

The averages were plotted against the five classes in Figure 1. It is evident that the averages increase successively up to the junior class, then there is a drop for the seniors, and again a considerable rise for the graduates.

A general trend toward pacifism may be noted in the successive mean scores of the first three classes and the graduate class. This is an indication that education is influential in shaping the attitudes of students in the direction of pacifism.

2. *Education of Parents.* To ascertain the relation between the education of parents and the attitudes of their sons and daughters

on war and peace the Pearson coefficient of correlation was used. No relation was found to exist between the two variables. The coefficient was found to be —.02 in all the three correlations:



between militarism-pacifism of children and education completed by fathers, mothers, and by both fathers and mothers. The correlations found indicate that the influence of the education of parents has no effect upon the attitudes of their children.

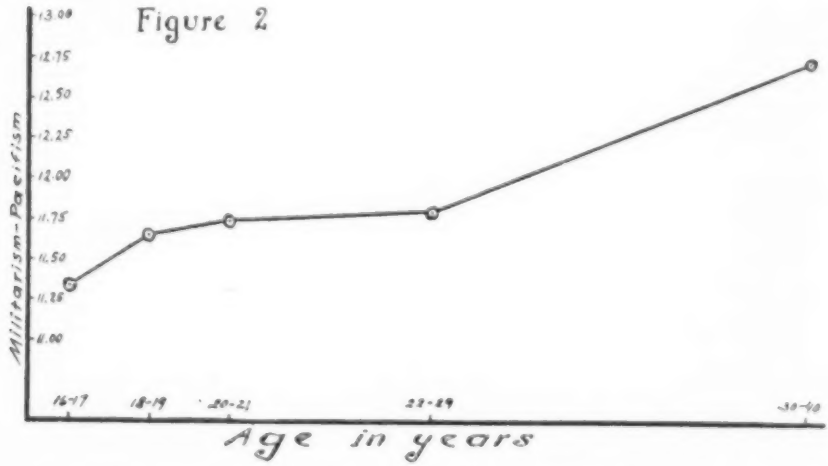
3. *Age.* From our scale the ages of 784 students were obtainable. These were divided into five age groups as follows: 16–17,

18–19, 20–21, 22–29, and 30–40 years of age. Table II shows the number of cases in each group, the average scores for each, the standard errors of the averages, and the sigmas. Figure 2 graphically represents the averages. As is readily seen there is a tendency to an increase of pacifism between the ages of 16–17 and 30–40 years.

TABLE II

Group	Years	N	Mean Score	σ_m	σ
I	16–17	141	11.33	.17	2.08
II	18–19	323	11.64	.10	1.94
III	20–21	175	11.73	.15	2.10
IV	22–29	101	11.78	.21	2.14
V	30–40	34	12.71	.34	2.00

In order to check whether the increase of age is not due to education, the effect of age was studied for the educational groups separately. Results indicate that the seeming increase of pacifism with age is partly due to education.



In order to conclusively substantiate these findings a larger number of cases would be necessary for each class and each age group. However, we may conclude that as far as available data are representative there seems to be a slight tendency for the older students (graduates) to be more pacifistic than the younger students (undergraduates).

4. *Sex.* In this experiment data from 456 men and 376 women were available. The averages were calculated for both groups and were found to be 11.58 for men and 11.73 for women. The difference between the two is .15 which is only about as large as

the standard error of the difference. This is an indication of a slight tendency for the men to be more militaristic than the women.

The standard deviations for the two groups are: 2.13 for men and 1.91 for women, the difference being .22. According to this difference men appear to be more variable in their attitudes than women. Women seem to be in closer agreement with each other in respect to militarism-pacifism.

5. *Expenses.* Five hundred and ninety students indicated how much they spend each month. This is only a very rough index of the economic status of students, and our data may be highly inaccurate. Under "monthly expenses" some may have included tuition and room rent, some may not.

In terms of the means of the scores no significant differences in attitudes were found between the groups. There is only a suggestive tendency for the poorest group to be more pacifistic, on the whole, than the middle group.

6. *Traits.* Scores on Thurstone's Psychological Examination obtained in the fall of 1928 were compared with the war-peace attitudes of 256 freshmen. A correlation coefficient was computed between the raw intelligence scores and the attitude scores. This was found to be —.024 which indicates an absence of any relation between the two sets of measures.

Data obtained on Thurstone's Personality Schedule in the fall of 1928 were compared with scores on militarism-pacifism for 254 freshmen. The correlation coefficient between the two series of measures was found to be —.01. Again no relation exists between the neurotic personality score and militarism-pacifism.

7. *Interest.* Six hundred and twenty-six students indicated on the scale blanks their subjects of major interest and accordingly were divided into three main groups: the exact sciences group, the languages and literatures group, and the social sciences group. Such division is more or less arbitrary and overlappings are unavoidable. Yet each of the three groups represents a somewhat homogeneous collection of interests.

TABLE III

Major Interest	N	Mean Score	σ_m	σ
Exact sciences	134	11.30	.15	1.84
Languages and literatures	188	11.80	.13	1.90
Social sciences	304	11.85	.11	2.06

A mean score was then calculated for each of the three groups and tabulated in Table III. Students interested in social sciences and languages and literatures seem to be more favorable to peace

than students interested in the exact sciences. No difference seems to exist in attitudes between the languages-literatures and the social sciences.

Certain differences between the standard deviations of the distributions of attitudes may be noted in the table. The exact science group seems to be the least variable in attitudes toward war and peace. The social science group is the most variable of the three groups, while the languages and literatures group occupies an intermediate position.

TABLE IV

Party	N	Mean Score	σ_m	σ
Republican	447	11.29	.08	1.82
Democratic	129	11.49	.17	1.94
Socialist	21	13.83	.44	2.05

8. *Political Party.* Politically the majority of students who took the test belonged to the Republican party, 447 in number. There

were besides 129 Democrats, and 21 socialists. Table IV shows the mean scores for each of the three groups. The difference between Republicans and Democrats in attitudes toward war and peace is insignificant. It is only suggestive since the difference is only about once as large as the standard error of the difference. However, the difference between the socialist group and the other two are significant. The differences between the averages are about five times as large as the standard errors of the differences. According to the these data Socialists appear to be much more pacifistic than either the Democrats or the Republicans. A comparison of distributions in Figure 3 bears out these findings.

9. *Church Affiliation.* Six hundred and twenty-one cases on church affiliation were available from the printed scale testing.

Ten groups were selected for study. Among these is included a group of students who did not specify any particular denomination but simply called themselves "Protestants". Table V shows the mean scores, one for each group arranged in rank order. It also shows the standard errors of the averages and the standard deviations of the distributions of scores.

"Protestants", Jews, and Christian Scientists appear to be the most peace-minded believers. Catholics and Lutherans have the smallest averages and hence are the most militaristic of the ten groups compared. Other groups are in the medium range.

TABLE V

Denomination	N	Mean Score	σ_m	σ
Protestants	44	12.03	.28	1.86
Jews	158	11.96	.15	1.96
Christian Scientists	27	11.92	.32	1.68
Methodists	76	11.87	.24	2.17
Baptists	44	11.70	.29	1.93
Presbyterians	93	11.47	.19	1.90
Episcopalians	32	11.33	.34	1.94
Congregationalists	34	11.25	.28	1.66
Catholics	78	11.17	.19	1.76
Lutherans	35	10.89	.30	1.79

With reference to variabilities no significant differences or similarities can be spotted. With the exception of Congregationalists there seems to be a tendency for the dogmatic churches, the Christian Scientists, the Catholics, and the Lutherans, to be least variable in attitudes toward war and peace.

In order to obtain larger groups for comparison all the protestant denominations were thrown together, and a non-religious group was added. For both of these groups mean scores, standard errors, and the standard deviations were calculated and placed in Table 6 along with the data obtained for Catholics and the Jews.

TABLE VI

Groups	N	Mean Score	σ_m	σ
Protestant denominations	385	11.60	.09	1.92
Catholics	78	11.17	.19	1.76
Jews	158	11.96	.15	1.96
Non-religionists	111	12.18	.21	2.27

Certain differences appear between the mean scores of the groups. Catholics have the smallest average, Protestants come next, Jews next, and the non-religious groups have the largest average. Yet to rank these groups on the basis of degree of militarism-pacifism as expressed by the mean scores is unreliable. National differences seem to enter to disturb the validity of such

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rankings. In the non-religious group are only 40 per cent of students whose parents are both Americans, while among Protestants 61.5 per cent are of American parentage. If the 12.6 per cent of Jews who said their nationality was Jewish is included in the foreign parentage as in Table VII, this group has a still smaller percentage of students of American descent. It is 26.5.

TABLE VII

PERCENTAGES OF NATIONAL DESCENT IN THE RELIGIOUS AND NON-RELIGIOUS GROUPS

Group	Both Parents American	One Parent American	Foreign Parentage
Protestants	61.5	13.5	25
Catholics	50	6.4	43.6
Jews	26.5	17.1	56.4
Non-religionists	40	11	49

The non-religionists and the Jews have the largest per cent of foreign parentage.

The non-religionists have the largest standard deviation indicating the widest variety of attitudes on peace and war. Catholics, on the contrary, have the smallest sigma (see Table VI) and hence the least variability of all. This is what one would expect for Catholics have a degree of uniformity in their convictions which the non-religionists certainly do not have.

10. *Occupation of Father.* Scores of four hundred sixty-four students were classified into three groups on the basis of the occupation of fathers, and a mean score was calculated for each. For a group of 112 students, whose fathers were tradesmen a mean score of 11.57 was obtained. One hundred and ninety-six students' scores whose fathers were engaged in some kind of business gave a mean of 11.62. The third group of students of fathers with a professional occupation yielded a mean score of 11.76.

The differences between the averages of the three groups are not significant. Some difference seems to exist between the standard deviations of sons and daughter of tradesmen and professionals (2.17, 2.12) and the standard deviation (1.87) of the business men's sons and daughters. Attitudes of the latter group seem to vary less than the attitudes of the other two groups.

11. *War Service.* In order to ascertain whether participation in war has any effect on the attitudes toward war and peace an attempt was made to get in touch with ex-service men, students at the University of Chicago. Within a reasonable time it was possible to get in touch with and to obtain returns from 33 such subjects.

TABLE VIII

Group	N	Mean Score	σ_m	σ	Diff.$_m$	σ_d	D/σ diff.
War-service	33	12.35	.31	1.78	.69	.37	1.86
Non-service	74	13.04	.21	1.89			

Table VIII shows the average scores for all the war-service men tested. Since practically all of the war-service people were graduate students only graduate non-service people could be compared with them. Women had to be eliminated from the comparison group because all war-service people were men. The difference between the averages of the war-service and the non-service men was found to be .69 with a standard error of the difference of .37 which gives a D/σ diff. of 1.86. This indicates a tendency for the non-service people to be more pacifistic than the war-service group.

12. *Employment.* Data on 802 students were available for the purpose of studying the effect of outside employment on attitudes toward war and peace. Four hundred and eighty-four students were found to be unemployed and 318 employed. For each of the two groups an average score was calculated. The unemployed students obtained a mean score of 11.59 and the employed ones a mean score of 11.74. The difference between these two mean scores is too small to indicate any relation between employment and militarism-pacifism.

13. *Nationality of Parents.* For the purpose of controlling the effect of employment the available data on the nationality of parents were first divided into two groups: the unemployed and the employed group. Then each of these two groups was again divided in two; students of American parentage and students of mixed and foreign parentage. The mean scores obtained for each of the four groups may be seen in Table IX.

TABLE IX

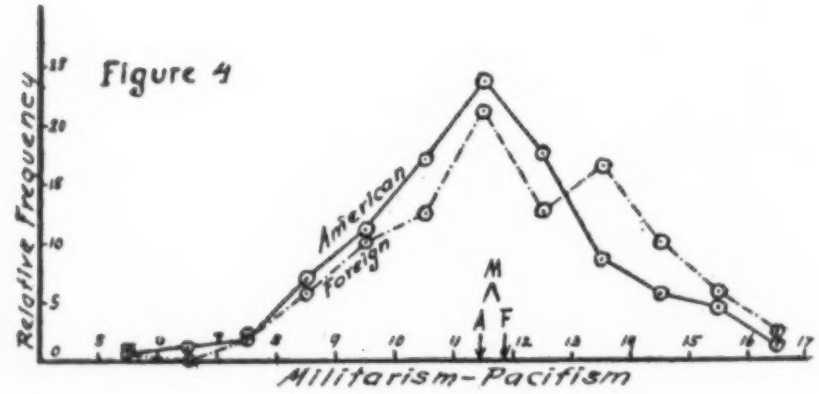
Employment	Parentage	N	Mean Score	σ_m	σ
Unemployed	American	240	11.40	.12	1.90
	Mixed and foreign . .	244	11.79	.11	1.87
Employed	American	122	11.66	.20	2.23
	Mixed and foreign . .	196	11.80	.15	2.17

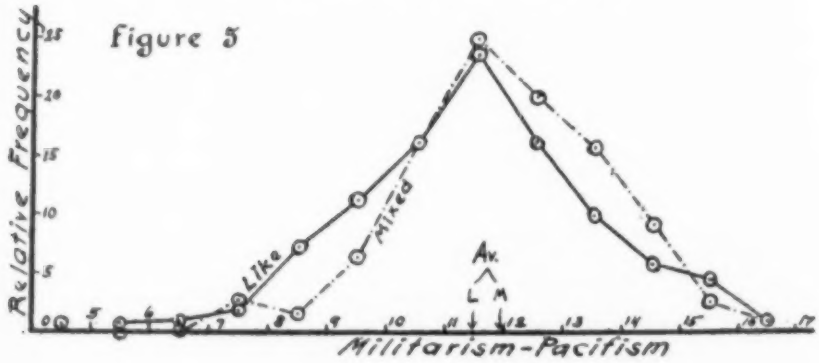
In Table X students of American parentage, 384 in number, are compared with 170 students of foreign parentage only. The latter group includes 55 students of British parentage, 54 of Slavic

parentage, 42 of Jewish parents, and 19 of German parents. A mean score was calculated for each of the two groups. Students of American descent scored an average of 11.45, students of foreign descent obtained an average score of 11.96. The difference between the two means was found to be .41 with a standard error of .18, the ratio between the difference and the error being 2.27, which is an indication that students of foreign parents tend to be, on the whole, more favorable to peace than students of American parentage. Chart 3 shows the extent to which the distributions of the two groups overlap.

TABLE X

Parentage	N	Mean Score	σ_m	σ
American	384	11.45	.10	2.00
Foreign	170	11.86	.16	2.20
Like	458	11.48	.09	2.07
Mixed	188	11.92	.13	1.83





The next comparisons concern the effect of mixed parentage on attitudes toward war and peace. Three nationalities were selected for this purpose: American, British, and German. Students of like American, British, and German parentage were put together to constitute a group of 458 students of "like" parentage. Students whose one parent was American, British, or German composed a group of 188 students of mixed parentage. The mean scores calculated for each of the two groups are 11.48 for "like" group and 11.92 for the "mixed" group, the difference being .44, as shown in Table X. The standard error of the difference is .15, and the difference divided by the error is 2.93. According to these data students of mixed parentage tend to be, on the whole, more favorable to peace than students of like parentage. This tendency is also shown on Chart 4.

To show how consistently mixed parentage does affect militarism-pacifism separate data were produced for each national group.

TABLE XI

Parentage		N	Mean Score	σ_m	σ
American	One	66	11.92	.22	1.81
	Both	384	11.45	.10	2.00
British	One	72	12.06	.21	1.85
	Both	55	11.46	.33	2.49
German	One	50	11.80	.20	1.46
	Both	19	11.54	.39	1.72

In Table XI will be found attitudes of students where only one parent was American compared with attitudes of students whose both parents were American, attitudes of students where only one parent was British compared with attitudes of students whose both parents were British, and attitudes of students where one parent was German compared with attitudes of students whose both parents were German. It can be readily seen from the table that some difference exists in each pair of groups, .47 for the American pair, .60 for the British, and .26 for the German pair. In all three cases variations in attitudes of students of like parentage are greater than variations in attitudes of mixed parentage.

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CONCLUSIONS

The above findings may be summarized as follows:

1. The correlation between militarism-pacifism and self-ratings was found to be +.75.

2. Education is influential in modifying attitudes in the direction of pacifism. No relation was found between the education of parents and militarism-pacifism of students.

3. Little or no difference in attitudes toward war and peace was found among the lower age groups. Older students (graduates) tend to be, on the whole, more favorable to peace than younger students (undergraduates).

4. Men tend to be slightly more militaristic than women. Women vary less than men.

5. No significant differences in attitudes were found between groups classified according to monthly expenses.

6. Neither intelligence nor the neurotic scores correlate with militarism-pacifism.

7. Students interested in the exact sciences appear to be less pacifistic than students interested in social sciences or languages and literatures. Practically no difference exists in attitudes between social scientists and those interested in languages and literatures. Exact scientists are least variable in their attitudes, while the social scientists vary most of the three groups compared.

8. Socialists are more in favor of peace than either Republicans or Democrats.

9. Catholics and Lutherans seem to be, on the average, the most militaristic churches of the ten compared. "Protestants", Jews, and Christian Scientists are the most pacifistic of the ten. The non-religionists vary most in their war-peace attitudes, while the Catholics show the least variety in this respect. Protestant denominations taken together are more peace-minded than the Catholic church.

10. No appreciable difference in average attitude was found between groups classified on the basis of the occupation of fathers. Students whose fathers are engaged in some kind of business seem to be less variable in militarism-pacifism than students whose fathers are tradesmen or professional men.

11. War-service seems to influence men in the militaristic rather than the pacifistic direction.

12. No differences in attitudes were found between the employed and unemployed students.

13. A tendency was found for students of mixed and foreign

parentage to be more pacifistic, on the average, than students of American parentage. This difference is not altered if students of foreign parentage are compared with students of American parentage, neglecting mixed parentage. Students of mixed parentage (one parent American, British, or German, the other parent of a different nationality) are more favorable to pacifism than students of like parentage (both parents of either American, British, or German birth). The effect of mixture is independent of the nationalities combined. The attitudes of students of mixed parentage show a smaller deviation from the average than the attitudes of students of like parentage.

THE INTERNAL CONSISTENCY OF THE ALLPORTS' ASCENDENCE-SUBMISSION TEST (FORM FOR MEN)

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1. Introduction—The Problem

THE A-S Reaction Study,[2] devised by Floyd H. and Gordon W. Allport, was designed to measure the two traits of personality, ascendence and submission, on a single linear scale. It consists of questions relating to various social situations selected on *a priori* grounds, and its standardization was based solely on associates' ratings as its criterion. The method of scoring is to assign to each of the several answers of every question a numerical value determined originally by a formula based upon the frequency of that answer and the associates' ratings of the subjects making it. The question to be raised here is: What is the internal consistency of a test constructed and standardized by such a technique and procedure? In other words, assuming that the test is valid for the trait it purports to measure, are all the items in the test diagnostic of that trait? Also, since weighted score values are assigned to different responses, even though a legitimate procedure was followed, one could still ask: How would these score values show up under an analysis of their consistency?

The purpose of this study, therefore, is to make an experimental investigation of the internal consistency of the Allports' Ascendence-Submission test. While our task is mainly critical, it is hoped that these critical analyses may offer also a few constructive suggestions, although to carry them out must be the task of another investigation.

2. The Preliminary Series

Due to the facts that the test in question was separately standardized for men and for women and that the form for men

[1] The writer is indebted to Prof. F. A. Kingsbury for his interest, criticism, and suggestions. Thanks are also due Mr. J. C. Ellickson for having given much of his time in helping with the treatment of the data.

[2] Allport and Allport. "A Test for Ascendence-Submission." Journal of Abnormal and Social Psychology, 1928, XXIII, 2.

was based upon a much larger number of cases for its standardization, the men's form only is investigated in this study.

In the preliminary series, the test was given to 100 male students at the University of Chicago, largely Sophomores and Juniors, with ages between eighteen and twenty-four. The distribution of the scores obtained resembles very closely that which was presented as the original standardization group, as shown below:

	Allport	*Wang*
Obtained range	—55 to +55	—53 to +55
Mean of the scores	—0.35	—1.56
Standard deviation	.....	4.057

In order to see whether to each question positive responses were made more frequently by the ascendent subjects than by the submissive, negative responses made more frqeuently by the submissive subjects than the ascendent, and zero responses scattered evenly throughout the entire range, the total scores were arranged in their ranking order, from the highest positive to the highest negative, and all the response values were tabulated in the form illustrated below:

Subject	Total Score	Question 1			Question 2			Etc.
		a	b	c	a	b	c	
A	55	2				—1		&c.
B	46	2					2	
M	2		0				2	
N	— 1			—4	—1			
X	—47		0			—1		&c.
Y	—51			—4		—1		
Etc.								

From this tabulation it is obvious that one can tell not only how each question was answered by the entire range of subjects but also whether the trend is consistent with the total scores. Failure to answer some of the questions could also be noted, although it was found later that the number of omissions was not significant. Since the list of total scores was arranged in rank order, the 100 cases fell naturally into five groups of 20 per cent each, thus forming a convenient basis for summarizing the data for purposes of comparison and analysis. An example of this summary is given in Table I.

With the responses to each question by the 100 subjects thus tabulated, it becomes a relatively simple task to determine the discriminative power of every question. For example, referring

to Table I, Question 1 would be classified as diagnostic because the trend of the response to the positive answer (+2) decreases from 8 cases in the first 20 per cent (ascendent end) to 2 cases in the last 20 per cent (submissive end). The zero response is fairly evenly distributed, as it should be. The negative response (—4) increases in number from zero in the first 20 per cent to 7 in the

TABLE I

(SAMPLE)—ILLUSTRATING HOW THE RESPONSES TO EACH QUESTION WERE SUMMARIZED SO AS TO SHOW THE FREQUENCY OF EACH RESPONSE IN TWENTY PER CENT GROUPS

Question	Score	Frequency					Total
		1–20	21–40	41–60	61–80	81–100	
1. Witty comments	2	8	7	5	4	2	26
	0	12	13	12	15	11	63
	—4	0	0	3	1	7	11
	Σ	16	14	—2	4	—24	8
2a. Meet important person	1	8	5	3	8	2	26
	—1	11	14	10	10	8	53
	—1	1	1	7	2	9	20
	Omn.					1	1
	Σ	—4	—10	—14	—4	—15	—47
2b. Feel reluctant to meet him	—1	1	2	3	2	5	13
	—1	3	10	5	7	10	35
	2	15	8	12	11	3	49
	Omn.	1				2	3
	Σ	26	4	16	13	9	50
Etc.	&c.						&c.

last 20 per cent. In queston 2a, however, the situation is not quite the same. The positive response and the second negative response are consistent enough with the desired trends but the first negative response has a rather even distribution throughout the five groups, indicating that the negative value is not a proper score for this response.

Now coasider another point. If it is correct to assume that the ascendent group should respond largely to the positive scores and the submissive group largely to the negative scores, then of course the algebraic sum of the products of the individual scores by their respective frequencies (Σ's shown in Table I) should be a positive number for the ascendent group and a negative number for the submissive group, with the three intermediate groups uncertain. The only justifiable exception to this would be in cases where only one type of response (either positive or negative) and

a zero are present. Furthermore, since the assignment of the different scores to the answers was originally in each case based upon a frequency plan, the algebraic sum of the Σ's of every question should approach zero. It is true, theoretically, that there can be questions which are diagnostic only for ascendence and not for submission, or only for submission and not for ascendence, and therefore would have positive or negative Σ's only, but in such instances the frequency of the diagnostic response should be relatively low and be limited to the trait for which the question is supposed to be diagnostic. Actually, however, there are only two questions (5b and 21a) which have merely a diagnostic (in both cases negative) score and a zero, but the distribution of the responses in either instance did not conform rigidly to these specifications. Certainly for those questions that call for both positive and negative scores it is legitimate to compute the algebraic sum of the Σ's for each question and to see whether and wherein a score value has not been consistently weighted even if the character (positive or negative) of the score is itself diagnostic. To illustrate, referring again to Table I, if the second score in question 2a were zero, instead of —1, not only would all the responses of that question become diagnostic but also the total of the Σ's instead of being —47, would be +6, which can be said to approach zero. Also, in question 2b, all the scores seem to be diagnostic, that is, consistent with the trend, but the total of the Σ's is 50. If, however, the score of +2 had been +1, it would not only continue to be just as diagnostic but also make the total of the Σ's +1, which approaches zero.

On the basis of these considerations, it was possible to classify the forty-one questions of the test into four groups: (1) Diagnostic, (2) Diagnostic but needing score revision, (3) Partially diagnostic, *e.g.*, 2a in Table I, and (4) Undifferentiating.

3. The Confirmation Series

In order to determine that the results of the preliminary series were reliable, the entire procedure was repeated with a second group of 100 male subjects.

It is significant to note two points here: First, the frequency distribution of the total scores of the second series was similar to that of the first, and both similar to the Allports' original standardization group. Secondly, the same diagnostic questions found in the first series were also found to be diagnostic in the second

series and the same undifferentiating questions in the first series also undifferentiating in the second.

4. Analysis of Combined Data

Having thus determined the reliability of the procedure, the scores of the two series were pooled together for the considerations that follow. Inasmuch as our purpose in this study is merely to ascertain the diagnosticity, or the lack of it, of the questions of the ascendence-submission test, and not to concern ourselves with the further important question of reweighting the scores, a presentation of the responses of the most ascendent 20 per cent and those of the most submissive 20 per cent will be sufficient. This presentation is found in Table II. On the basis of an approximate ratio of two to one, arbitrarily adopted as our

TABLE II

Comparison of the Responses Between the Ascendent 20 Per Cent and the Submissive 20 Per Cent of 200 Male Subjects to Each Question in the Allports' A-S Reaction Test

Question No.	Score	Frequency A-20%	Frequency S-20%	Question No.	Score	Frequency A-20%	Frequency S-20%
1	2	16	3	18	−3	1	2
	0	24	23		−1	14	20
	−4	0	14		1	25	18
2a	1	21	4	19	2	17	6
	−1	18	16		−1	19	26
	−1	1	19		0	3	6
					0	0	2
2b	−1	1	14				
	−1	6	17				
	2	32	7	20	2	15	6
					−1	23	28
3	1	8	1		−6	1	6
	0	22	24	21a	−1	12	26
	−1	8	15		0	27	14
4	−1	6	21	21b	−1	19	29
	0	13	13		1	20	11
	1	21	6				
					1	16	9
5a	1	27	7	21c	−1	3	24
	−2	13	32		2	19	7
5b	−1	16	34				
	0	22	3	22a	1	28	16
					0	9	17
6a	4	13	2		−1	3	7
	2	26	7				
	−1	1	24	22b	−1	0	9
	−2	0	3		−1	18	28
					3	22	2
6b	−2	1	18				
	0	18	17	23a	1	12	17
	4	21	1		0	24	17
					−1	4	6

Question No.	Score	Frequency A–20%	Frequency S–20%
7	2	27	6
	−2	6	6
	−2	0	6
	−1	6	22
8	2	33	6
	−2	1	24
	−3	0	5
	−2	3	5
9	−4	1	9
	0	22	28
	2	17	3
10	4	8	1
	−1	28	25
	0	4	14
11	−1	6	2
	−2	8	27
	1	22	10
12	2	30	3
	−2	5	30
	−1	1	7
13	1	27	8
	−1	9	16
	−1	4	14
14	−2	3	7
	−2	22	32
	2	15	1
15	2	7	1
	0	20	19
	−1	13	19
16	1	19	10
	−1	18	20
	−1	3	9
17	3	11	0
	0	24	22
	−1	4	16
23b	7	15	0
	1	23	22
	−2	1	18
24	1	27	9
	−1	13	27
	−1	0	4
25	3	22	3
	−1	14	21
	−3	1	14
26	2	26	6
	−2	11	23
	−2	0	10
27	−4	1	9
	−1	10	20
	1	28	10
28	1	19	6
	−1	13	27
	0	6	7
29	2	15	6
	0	18	18
	−1	7	16
30a	3	11	0
	1	21	13
	−2	8	27
30b	6	12	0
	0	27	19
	−6	1	21
31	1	22	13
	0	14	7
	−4	2	9
32	2	17	0
	−1	6	11
	0	16	28
33	−1	16	28
	0	16	10
	1	7	2

criterion of diagnosticity, the diagnostic questions are found to be: 1, 2b, 3, 4, 5a, 6a, 6b, 8, 9, 12, 13, 17, 21a, 21c, 24, 26, 27, 28, 29, 30a, 30b, and 32. However, since our only criterion in this study is the total score, the remaining nineteen questions demand something more than a curt dismissal. Furthermore, it will be readily noted from Table 2 that there are not two sharply differentiated groups of questions, mutually inconsistent, but that the

diagnosticity of the various questions decreases gradually from high positive to negative. Most of them show at least some tendency or trend to be consistent. Since we are forced to use the total scores as our criterion, it would be desirable to use as many of the questions as possible. By being a little more lenient, therefore, it is possible to add questions 2a, 5b, 7, 22a, 22b, 23b, 25, and 31 to the original list of diagnostic questions, even though each of these nine has some response that does not quite measure up to the criterion of two to one. The remaining eleven questions, viz., 10, 11, 14, 15, 16, 18, 19, 20, 21b, 23a, and 33, are regarded as definitely undifferentiating, and in a few cases even showing a reversed trend, as in questions 11 and 23a.

Next, assuming that we have differentiated the two groups of questions—A, containing the thirty diagnostic ones and B, consisting of the eleven undiagnostic ones, we proceeded to make the following comparisons:

(1) Correlation between A and total scores	.97 ±.0028
(2) Correlation between B and total scores	.597±.003
(3) Correlation between A and B	.403±.004

(1) The high correlation of .97 between the total scores and the scores of the thirty diagnostic questions makes these thirty questions practically equivalent, as a measure of the ascendence-submission trait, to the Allports' A-S test in its totality. That being so, one is tempted to ask: Why use the longer test if the shorter one serves the same purpose?

(2) The relatively high correlation of .597 between the total scores and the eleven supposedly undiagnostic questions would seem to suggest that these eleven questions are after all fairly consistent with the test and should not be eliminated. Even so, however, they are obviously contributing little to the test since without them the remaining questions yielded a correlation coefficient of .97 with the total scores. Furthermore, this correlation of .597 is partly due to the fact that the eleven questions are a part of the total score against which they were correlated.

(3) The true indication of the value of these eleven questions to the test would therefore be a correlation between their score and the score of the other thirty questions. This was found to be .40. Under certain circumstances one might be justified to argue that a correlation between parts does not have to be high to make either part valuable to the whole. In this case, however, this argument cannot apply, because in the first place the test was not made up of diversified groups or batteries of tests each measuring a

different factor of the trait that the whole test measures, and secondly, because the thirty best questions in this case can virtually stand for the whole A-S test. Thus, if it has not been shown—and it cannot be shown conclusively without outside criterion—that these eleven questions may be actually detrimental to the test, it at least seems quite clear that their presence adds little value to it.

As a further evidence that the eleven questions (B) are at least less consistent with the test than the others, we selected at random eleven questions (C) from the thirty, compared their score with the total and obtained a correlation coefficient of .799 ± .0169. The questions selected were: 1, 2b, 4, 5a, 6a, 6b, 12, 17, 21c, 24, and 28.

Next, correlating these eleven random diagnostic questions with the thirty, the coefficient obtained is .875 ± .011. This may be regarded as additional evidence that the eleven questions (B) designated as undifferentiating actually do not approach the diagnostic power of practically any other eleven questions in the thirty.

It is to be admitted that in eliminating the eleven questions (B) designated as undifferentiating from the test, the test has not been improved unless brevity itself is an improvement. Undoubtedly, the most serious difficulty with the test in its present form lies in the score values assigned to the various answers. Indeed, a reweighting of the scores would not only eliminate certain inconsistencies yet to be found even among the thirty diagnostic questions but would make several of the eleven poorly diagnostic questions diagnostic and consistent, thus forming a valuable addition to the test. However, such reweighting or rescaling would require a different technique from that employed in this study whose task, as stated in the beginning, must end at being critical and suggestive.

BEHAVIORISTIC ASPECTS OF HYPOGLYCEMIA

By AGNES A. KAMPER

HYPOGLYCEMIA is a rather recent advent in the scientific world. Not until Folin, of Harvard, perfected microchemical, colorimetric methods of blood analysis were physicians and biochemists able to determine the state of lowered blood sugar which is known as hypoglycemia, glycopenia, or hyperinsulinism. Within a brief period this condition of hypoglycemia, which McClenahan and Norris (1) term "a new disease entity", has assumed an important place among the clinical and pathological studies that are being conducted in America and abroad. However, so far as we have been able to ascertain, the psychological world has ignored the many interesting aspects of behavior which are the concomitants of this disease. It is our purpose, in this paper, to indicate those phases of hypoglycemia which have peculiar significance for the psychological examiner who is interested in the abnormalities of human behavior, and in the etiological factors from which they originate.

A review of the literature of hypoglycemia reveals that this disease occurs in many and diverse conditions, and arises from a variety of causes. However, from the standpoint of etiology, this disease may be divided into two general categories. In the first group are included the provoked forms of hypoglycemia, and in the second, the spontaneous types.

Of the provoked forms of hypoglycemia, the most familiar are those induced by the injection of insulin and insulin-like substances. In addition, there are many other types which are not so readily recognized. Josephs (2), who studied the curve of the blood sugar, the excretion of acetone bodies, and the respiratory quotient in children who underwent short periods of ether anaesthesia for tonsillotomy, found that in every case there was a fall in blood sugar content, and that this decline occurred with great regularity from eighteen to twenty-four hours after anaesthesia. He came to the conclusion that the degree of hypoglycemia seemed to depend upon something inherent in the metabolism that was called into being by the anaesthetic, and which functioned for short periods. Pemberton (3) states that hypoglycemia may be caused by chloroform, and when so induced, is brought about by

parenchymatous changes in the liver. He also observes that provoked states of hyperinsulinism may be induced by hydrazine, salvarsan, the fungus, Agaricus Bulbosis, and by phosphorus. The claim of Pemberton that phosphorus may cause glycopenia is confirmed by Josephs (3), and by McLean, MacDonald, and Sullivan (4), who report hypoglycemia similarly induced. Hyperinsulinism resulting from alkalosis, hypocalcaemia, and the intravenous injection of sodium bicarbonate is also cited by Pemberton.

Provoked forms of hypoglycemia may be acute in form and terminate fatally, but they do not occur over long periods of time as do the spontaneous types of the disease. One of the most interesting reports of spontaneous hypoglycemia, which also may be transitory in a predisposed individual, is that given by Gordon, Kohn, Levine, et al. (5) who made a study of the blood sugar content of runners in a Marathon race. In the 1924 Marathon, it had been noted that, at the end of the race, the sugar content of the blood was moderately diminished in two of the runners, and markedly diminished in four. Furthermore, it had been discovered that those individuals who had a low blood sugar presented a picture of shock similar to that produced by an overdose of insulin. In preparation for the 1925 Marathon, Gordon and his associates did some research work during the training season. They found that while some runners, after the usual slight initial rise, could maintain normal blood sugar level for the entire distance of twenty-five miles, that in others there was a definite decline in the level between the fourteenth and the eighteenth miles, with attending hunger and weakness, the two cardinal symptoms of hypoglycemia. The experimenters decided to give the runners who developed glycopenia during the long distance trials, and those who had reported hunger and weakness the year before, a large amount of carbohydrate the day before the race in order to increase the storage of glycogen, and to furnish glucose candies to be eaten during the race, whenever the individuals felt weak. In addition, tea containing large amounts of sugar was to be supplied at stations along the course.

The experiment was a success. The blood studies made during the 1925 Marathon showed normal blood sugar levels in all runners, a striking improvement in their physical condition, and, in a number of cases, a faster running time than the year before. The investigators concluded that the exhaustion, weakness, and shock, as well as other symptoms of hypoglycemia following prolonged

athletic effort might be prevented by the timely ingestion of carbohydrates. Since it is a well known fact that the muscle gets its power through the oxidation of sugar, one can readily understand that temporary glycopenias may result from muscular fatigue. Other cases in the literature confirm the fact. Both Pettersson (6), and Mario Cayrel, as quoted by Sendrail and Planques (7), have observed hypoglycemia in cases of parturience, and Cayrel has discovered that uterine contractions may be induced by the administration of sugar. In view of the prolonged muscular effort required in labor, the findings of Petterson and Cayrel are entirely believable.

Hypoglycemia is associated with muscular dystrophy by McCruddon and Sergeant (8). They are of the opinion that the low sugar content of the muscle, existing as the result of glycopenia, may be looked upon as muscular weakness.

Many other types of hypoglycemia are reviewed in the literature. Jonas (9), Woodyat (10), Joslin, as quoted by Hartmann (11), and others report severe cases of hypoglycemia among individuals suffering from diabetes mellitus. Harris (12) describes five cases of chronic hyperinsulinism with an average blood sugar of 60 milligrams per 100 c.c. of blood. Leyton (13), Pribam (14), Hoxie and Lisherness (15), Sendrail and Planques (7), and other observers have noted cases of glycopenia. Greenwald and Eliasberg (17) describe two cases of profound hypoglycemia in children suffering from superficial burns. Death resulted in both instances. Chemical examination of the blood of the first child, aged two years, at the time of admission to hospital, revealed a complete absence of sugar. An examination, immediately after death, of blood from the heart of the second child, aged three years, showed a sugar content of less than 30 mg. per 100 c.c. of blood.

Hypoglycemia in children is not at all rare. Griffiths (18), in an article dealing with glycopenia and the convulsions of early life, reports nine cases in which convulsions occurred in children, and asserts that there is probably a frequent association between this disorder and the existence of a hypoglycemia. He believes that convulsions may occur without a decline in blood sugar, but that in many instances hypoglycemia furnishes the causitive relationship. Josephs (19), in his paper, "Spontaneous Hypoglycemia in Early Childhood", presents several cases of glycopenia with convulsions. Two of the cases he reports terminated fatally, and post-mortem examinations were made in both

instances. In each case necropsy revealed a fatty accumulation in the liver and kidneys. Josephs believes that profound alterations in the liver, accompanied by an acute hypoglycemia, are characteristic in the convulsive states which he describes. However, he very wisely stresses the fact that other organs of the body may be affected even though no anatomic changes may be found at autopsy.

Hypoglycemia in premature infants was discovered by Van Creveld (20) who made a study of sixty premature children during fasting in the first months of life. He found that during this period the blood sugar levels tended to be extremely low; with a few exceptions, much lower than in full term children of the same age. The author considers the fact that hypoglycemia exists in premature children to be an argument for the "functional immaturity of the premature". The findings of Van Creveld are confirmed by Josephs (19), who concludes from his own experience, and that of others in dealing with children that the lability of the blood sugar, which is usual in infancy, may persist in childhood, and may constitute the constitutional factor in the hypoglycemic syndrome.

The hypoglycemias involving pathological changes are of three general types, arising from disorders of the liver, pancreas, and endocrines. We have shown that the glycopenias in children, which Josephs (20) reported, were hepatic in origin. Another instance of hyperinsulinism of this type is cited by Nadler and Wolfer (21). Their patient, an adult negro, suffered from hypoglycemia which was associated with primary liver cell carcinoma. For a period of three and a half months preceding the fatal termination of the disease he was afflicted with violent hypoglycemic convulsions and coma. Necropsy revealed a carcinoma which involved 70 to 80 per cent of the liver mass. The pancreas contained a normal amount of insulin and presented no evident pathological changes.

Wilder and his colleagues (22) at the Mayo Clinic give the most excellent report of a spontaneous hypoglycemia in the literature of the subject. They describe a carcinoma of the Islands of Langerhans accompanied by a hypoglycemia of such violent and distressing character that the patient died from exhaustion. Autopsy showed carcinoma of the pancreas and carcinomatous metastasis of the liver and lymph nodes. We shall give additional details concerning this case when we discuss the symptomatology of hypoglycemia.

Thalheimer and Murphy (23) also review a case of carcinoma of the pancreas coexistent with hypoglycemia. For a period of two and a half years the symptoms increased in severity until death occurred from exhaustion. Post-mortem examination disclosed a small primary tumor in the pancreas which the authors consider to be carcinomatous rather than adenomatous.

McClenahan and Norris (1) definitely associate adenoma of the Islands of Langerhans with hypoglycemia. Their patient suffered from periodic attacks of hypoglycemia accompanied by loss of memory, followed by coma, and finally by death. At autopsy there was discovered a large circumscribed pancreatic nodule. Although McClenahan and Norris (1) concede that in the twenty cases of adenoma reviewed by Warren (24) the pancreatic lesions were probably subsidiary, they believe that under certain conditions, such as existed in their case, there might be a definite relationship between an adenoma and a symptom complex. It is their opinion that in the case reported by them the adenoma retained the function of the parent cell, and thus was definitely related to the hypoglycemia. Since the cases reviewed by Warren, as well as by Cecil (25) were before the time of blood sugar analysis, the conclusions of McClenahan and Norris cannot well be disputed. We believe that their ante-mortem blood studies, with a blood sugar level as low as 38 mg. per 100 c.c. of blood, establish the soundness of their deductions.

The only case of hypoglycemia with hypertrophy of the Islands of Langerhans, in an adult, reported in the literature is that presented by Phillips (26). Post-mortem findings revealed no cause for glycopenia other than enlargement of the Islands. Since in this case hypoglycemia was not the precipitating cause of death, Phillips believes that hyperplasia of the Islands, with increased insulin production, may offer an explanation for the forms of hypoglycemia which are long in duration, exhibit mild symptoms, and are relieved by a diet high in carbohydrates.

Two interesting cases of hypertrophy and hyperplasia of the Islands of Langerhans in infants, born prematurely of diabetic mothers, are reported by Dubreul and Anderodias (27) and Gray and Feemster (28). Both infants died shortly after birth. Autopsy, which was performed in both cases, showed the pancreas of each child to be enormously enlarged; twenty-four times the normal size in the case of Gray and Feemster. Both reports are of marked interest because of the compensatory phenomena involved. In each instance, the superabundance of sugar in the

blood of the diabetic mother, on passing into the foetal blood through placentary exchange, produced a hyperglycemia in the foetus. Because of the increased demands made upon the Island tissue of the embryo, an increase in insular tissue became necessary. Gradually, hypertrophy and hyperplasia of the pancreas developed. When the maternal sugar was removed, at birth, it was necessary for the infant to utilize its own carbohydrates. Thereupon there developed a hypoglycemia. In the case of Gray and Feemster necropsy showed that there was also a hypertrophy of the cells of the medulla of the suprarenals. What part endocrinal malfunction played in the case is difficult to say.

A third form of hypoglycemia associated with pathological changes arises from disorders of the endocrines, particularly the pituitary, thyroid, and suprarenal glands. Jonas (29) who reviewed the literature of hypoglycemia up to the time of his case report in 1924, found that there existed a low blood sugar in diseases such as myxedema, cretinism, hypopituitarism, and Addison's Disease in which the endocrines were the dominating factor. Marañon, as quoted by Sendrail and Planques (16), was struck by the suceptibility of Addison's Disease to insulin, and noted that the various delirious and convulsive states observed in Addison's Disease and Encephalitis were similar to the manifestations of hypoglycemia. He attributed these facts to the action which the thyroid, pituitary, and suprarenals exert upon the metabolism of the glucides.

Pribram (30), who reports three cases of glycopenia of the chronic type, believes that in all three instances the lowered blood sugar was attributable to the hypoendocrinal condition of the ovaries—all three patients were women—the parathyroids, and in one case, of the pituitary. He advances the interesting hypothesis that the glycogen forming power of the liver is controlled by the splanchnic nerves, and that if the effect which these nerves exert is diminished, the blood sugar level will fall.

A case of endocrinal hypoglycemia, with the clinical diagnosis confirmed by post-mortem is that cited by Anna Pettersson (6). After an apparent recovery from premature labor, which had been accompanied by violent uterine hemorrhage, the patient had been discharged from hospital. Her husband arrived home one evening to find his wife in a state of coma. Her blood sugar, at the time of readmission to hospital, was 25 mg. per 100 c.c. of blood. Glucose and adrenalin were administered, and the patient regained con-

sciousness. However, she developed a broncho-penumonia which terminated in death. Necropsy revealed that the thyroid and suprarenals were greatly atrophied. The pancreas was not disproportionately large when compared with the size of the body.

Porges, whom Sendrail and Planques (7) also report as having observed a lowered blood sugar in Addison's Disease, has performed an interesting experiment involving the removal of adrenals in dogs (31). His results follow:

TABLE AFTER PORGES

	Per Cent of Blood Sugar Before Removing Adrenals	Per Cent of Blood Sugar After Removing Adrenals
Dog I	0.258	0.0058
	0.103	0.0057
Dog II	0.120	0.0033
Dog III	0.084	0.066
Dog IV	0.092	0.044

It is interesting to note that there have been other experiments involving the endocrines. Cannon (32) worked with twelve cats, first removing the suprarenals and then exciting the animals, in order to determine whether or not these ductless glands were responsible for glycosuria following emotional disturbance. He found that the animals with the suprarenals removed did not develop glycosuria when excited, but that the normal cats, which he used as controls, did develop hypoinsulinism. He concluded, therefore, that emotional disturbances were accompanied by a rise in the blood sugar level. However, Stewart (33), who also worked with cats, found that there was no evidence that the degree of excitement in these animals influenced the blood sugar content. Bowman and Kasania (34), who recently have written an article in which they discuss the question, remark that the data reported are contradictory; that there is considerable evidence to show that emotional states produce a rise in the blood sugar content, and *equally good evidence* that the sugar content is unaffected.

Another pertinent matter discussed by Bowman and Kasania concerns the blood sugar levels of psychotic patients. Norms obtained from such groups show that they have a normal blood sugar level according to the accepted standard of 80 to 120 mg. per 100 c.c. of blood. Therefore we must either reject the findings of Cannon, or say that emotions in psychotic persons are qualitatively different from those of normal individuals. Are they? The question has not been answered. These facts are significant for us because in hypoglycemia there occur, at certain lowered

blood sugar levels, types of behavior which resemble those of the psychotic state. Yet the individual afflicted is not psychotic in the accepted sense of the term.

In discussing the phases of behavior which appear in the hypoglycemic syndrome, we must establish the hypoglycemic blood sugar level at which these symptoms may be expected to appear. There is difference of opinion concerning this question. Trumper (35) places the normal blood sugar range at 80 to 120 mg. per 100 c.c. of blood. Joslin (36) posits the average normal at 90 mg. However, Sendrail and Planques (16) cite eight authorities who agree that a blood sugar level below 90 milligrams constitutes a hypoglycemia. Pribram (14) insists that mild chronic glycopenia, with symptoms of vomiting, headache, and weakness, occurs at a blood sugar concentration of 80 to 90 mg. per 100 c.c. of blood. He cites three cases to prove his point. Harris (12) states that patients suffering from hypoglycemia usually display a blood sugar below 70 mg. Sevringhaus, Kirk, and Heath (37) assert that hypoglycemic symptoms occur at concentrations of 40 to 65 mg., while Banting, Campbell, and Fletcher (38) place between 70 and 50 mg. the cases of hypoglycemia displaying mild symptoms, and below 50 mg., the acute, distressing ones. These differences of opinion may be due to one or more factors. Difference in technique, or the method employed, may affect a blood sugar level. The majority of American physicians employ the Folin-Wu method of blood analysis, although Josephs, at Johns Hopkins, uses the Fitz modification of the Bang method in making his studies. Another factor to be considered is the physical condition of the patient. Phillips' (26) patient, for example, suffered from uremia, in which the blood sugar level tends to be high. Therefore the patient may have suffered from a more profound state of hypoglycemia than the blood sugar readings indicated. In this paper, we shall accept the norm given by Trumper as the normal level, and will consider any reading below 80 as constituting a hypoglycemia.

The hypoglycemic syndrome is complex and varied. Asthenia and the hunger sensation, and in acute forms, coma, are rarely absent. In addition there are numerous other symptoms which may occur simultaneously or successively. In order to make clear the syndrome from the precursory to the acute state, we shall give the symptoms observed at various blood sugar levels in a case of acute spontaneous hypoglycemia, and in a case of hyperinsulinism following insulin shock.

Wilder's case of spontaneous, acute hypoglycemia was observed at the Mayo Clinic. The patient came to the Clinic for the third time with a history of an eighteen month period of illness. At first he had suffered from sudden faintness and weakness, as well as peristhetic numbness of the tongue and lips. The symptoms gradually became more severe. Delayed meals or the slightest exertion brought upon the patient an ever increasing weakness and profuse perspiration. Trembling developed at this stage. The patient, a physician himself, made the discovery that he could prevent the attacks by eating food or taking a sweet drink. Just prior to his third admission to the Clinic coma had followed an enforced fast. It had finally become necessary for the patient's wife to watch him as he slept, and to place sugar in his mouth as an oncoming attack became apparent. After the patient came to the Clinic sugar was withheld after the noon meal, and the patient was observed.

Three hours and twenty minutes after the noon meal the first symptoms were observed. At this time the blood sugar had fallen to 55 mg. per 100 c.c. of blood.

Blood Sugar	Time after Meal	Symptoms
55 mg.....	3 hours, 20 min.....	Sense of apprehension and depression; vague parasthesia. B. P. systolic, 110; diastolic, 60.
55 mg.....	3 hours, 35 min.....	Perspiration; tremor.
36 mg.....	4 hours	Face twitched; speech incoherent. B. P. sys., 134; dias., 60.
27 mg.....	4 hours, 15 min.....	Patient stuporous; no longer able to speak; tossed about with irregular, convulsive jerkings that affected entire body.

Fifteen grams of dextrose were given by mouth at this stage. In ten minutes the patient could converse rationally. Blood sugar, 65 mg.

The following symptoms were noted by Pribram (30) during an attack which a patient suffered as the result of an overdose of insulin. In contrast to the spontaneous hypoglycemia reported by Wilder, the following is the syndrome of provoked hypoglycemia.

Blood Sugar	Symptoms
80 to 70 mg.....	Weakness, pallor, flushing, tremulousness.
60 to 55 mg.....	Faintness, anxiety, excitability, emotional instability. (At this stage vertigo, profuse sweating, diplopia, and incoordination may develop.)
50 to 40 mg.....	The symptoms previously cited increase in severity. Sensory and motor aphasia develop; delirium, *disorientation*; delusions, confusion, bradycardia.
35 mg.....	Patient became unconscious.

Nadler and Wolfer (21) noted the following order of symptoms in a case of spontaneous hypoglycemia associated with primary liver cell carcinoma. The patient was subject to attacks which ranged from three to seven per day. During the intervals between attacks he was *normal mentally.*

First Phase:

I. Sense of fatigue—followed by
II. Dimness of vision which caused the patient to lay aside whatever he was doing.
III. Patient, with no sense of discomfort, would close his eyes and lose consciousness.

Unconscious Phase:

Characterized by:

I. Peculiar staring expression.
II. Rolling of the eyes.
III. Irregular movements of the arms and legs.
IV. Sclerae blood streaked; pupils dilated.

For some time the patient understood what was said to him but afterward he had no recollection of what had happened. The later attacks were associated with delirium. From an ordinarily mild mannered person the patient became noisy and resentful of his social status and treatment.

Leyton (13), who states that he has had 500 cases of hypoglycemia under his care, declares that the more important symptoms of hypoglycemia are the mental conditions. Some of his patients during a hypoglycemic attack behaved as if they were demented, or intoxicated with alcohol. Other individuals exhibited an aversion to sugar. Some of his cases believed themselves well and that their relatives were behaving peculiarly. One patient, " a most sober man ", became violent, using epithets of an insolent character, and displaying uncontrollable rage. Compelled to take sugar the attack passed in half an hour. Afterward the patient had no recollection of what had occurred.

Hartmann's (11) case during hypoglycemic convulsions displayed clonic, convulsive movements similar to those found in epilepsy. His funds being exhausted the family physician sent him to an institution for epilepties where he died in a convulsion which the medical examiner termed epileptic, but which Hartmann is certain was hypoglycemic.

The patient of McClenahan and Norris (1) was a negro truck driver, who had always been very careful about driving. After

he began to be afflicted with hypoglycemia he was arrested three times in a week for driving past signs. In addition to dimness of vision and diplopia, he suffered from attacks which consisted essentially of loss of memory. Between attacks the man was apparently normal. On the day he was brought to the hospital, in coma, he recovered consciousness and was eager to go home. In regard to this case it is interesting to note that when he was brought to the hospital a provisional diagnosis of epidemic encephalitis was made.

Hoxie and Lisherness (15) thought some light could be thrown on the question of hypoglycemia by studying blood sugar curves, and noting the symptomatology of the conditions which proved to be hypoglycemic; 307 cases were investigated, and four groups were made of the cases who had a blood sugar below 70. The groups were classified according to the following criteria:

Group I—Persons who had hypoglycemia, glycosuria, and *showed mental disturbance.*

Group II—The same as Group I, except that no mental disturbance was present.

Group III—Persons with hypoglycemia, but without glycosuria and mental disturbance.

Group IV—Persons with hypoglycemia and with *mental disturbance* but without glycosuria.

Of the 307 cases only 3 persons conformed to Group I, 5 to Group II, 9 to Group III, and 33 to Group IV. Of the entire group, 16.25 per cent suffered from hypoglycemia, and of these hypoglycemics, 84 per cent suffered from mental disturbances of which lowered blood sugar levels were the probable cause.

The syndrome of hypoglycemia, particularly in its mental aspects, is of startling significance to the psychological examiner who daily is faced with behavior problems in which fatigue, lassitude, irritability, heaviness of the head, headache, gluttonous hunger, twitching hands and trembling limbs, secretory troubles, lacrymation, diplopia, vasamotor trouble, and profuse perspiration are part of the clinical picture presented. This is the syndrome which Sendrail and Planques, after Van Norden and Isaacs (16), term the precursory symptoms of hypoglycemia. If an individual suffers from convulsions and coma he will seek a physician. It is the border line case, who is seldom ill and never well, who constitutes the problem that the psychological clinic attempts to solve.

There is a second class of clinical cases whose blood sugar

levels are a matter of interest to the psychiatrist and psychologist. In the course of this paper we have indicated that hypoglycemia may mask itself as epidemic encephalitis, aphasia, and epilepsy. Hartmann's case died in convulsions so resembling those of epilepsy that the institutional head and medical examiner were deceived. To the individuals intrusted with the care of those mentally afflicted, the further investigation of hypoglycemic states is both a hope and a challenge.

SUMMARY

I. The behavioristic aspects of hypoglycemia have peculiar significance for the psychologist who is interested in the abnormalities of human behavior, and in the etiological factors from which they originate.

II. Hypoglycemia is a state of lowered blood sugar which is found in many diverse conditions. There are two general types, the provoked forms which are induced by causes external to the organism, and spontaneous types which arise within the organism.

III. Spontaneous hypoglycemia frequently arises from pathological changes which are hepatic, pancreatic, or endocrinal in character.

IV. The normal blood sugar ranges from 80 to 120 milligrams per 100 cubic centimeters of blood. The mild and chronic symptoms of hypoglycemia are found at a blood sugar concentration which lies between 70 and 50 mg. per 100 c.c. of blood. Below 50 mg. are found the acute, distressing symptoms.

V. The hypoglycemic syndrome is complex and varied. Symptoms may be precursory or acute in character, and may range from hunger and weakness to convulsions and coma.

VI. The symptoms of hypoglycemia which have peculiar significance for the psychological examiner are those involving mental disturbances. These mental symptoms range in severity from border line cases that, because of physical incapacity of mild degree, constitute behavior problems in the school and home, to the acute forms which may be mistaken for epilepsy, epidemic encephalitis, and aphasia.

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A STUDY OF HYPNOTIC SUSCEPTIBILITY IN RELATION TO PERSONALITY TRAITS

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MANY fundamental facts about hypnosis are as yet unknown, and very little experimental work of a nature to check the multitude of theories has been undertaken. One rather important topic which has been neglected is that indicated in the title; namely, the relation of one's personality to his success as a hypnotic subject. We know that in some persons deep trances are elicited readily, while others never make even fair subjects. What makes these individual differences? Various theories have been advanced. One is that the operator's will must be stronger than the subject's; another that the subject must be capable of a certain degree of concentration; a third that too high intelligence works adversely because there is so much mental alertness that perfect relaxation is not possible. None of these hypotheses have been subjected to experimental verification.

Therefore, the major topic of this paper is the study of the causative factors of hypnotic susceptibility from the point of view of personality. Various tests of personality traits were used; and hypnotic susceptibility was ascertained from actual trance tests and scored on a specially devised scale.

TESTS

The tests used in this study consist of measures and inventories of personality traits. All are well known and need no detailed description here.

The *Personality Schedule*, devised by L. L. and T. G. Thurstone, (1) was used as a measure of maladjustment. This actually amounts simply to a neurotic inventory, being compiled largely from several shorter lists, and proposes to determine through a single index the extent of an individual's neurotic tendencies.

In determining the extent of introverted tendency, *Laird's C2* and *C3* lists were used. Since some persons absolutely refused to allow the operator to hypnotize them, and others had obvious inhibitions, we tried Watson's test of *Fairmindedness*. The other personality test used was the *Pressey X-O* affectivity test. Deviations from normal are counted as an "idiosyncrasy" score.

In addition we measured intelligence by means of the *Psychological Examination* of the American Council on Education.

For the study of hypnotic susceptibility a scale of an entirely new sort was devised by one of the writers, Mr. Davis. This scale was evolved with the particular object in mind of determining trance depth and it came about as the results of research with more than one hundred subjects. This objective method of scoring we feel to be justified by the fact that consistency in trance behavior was observed. For example, if muscular catalepsies could not be induced, anaesthesias were never successful. Other consistencies were likewise noticed.

This scale is reproduced in full in Table I. It will be noticed that we class five main states, with several quantitative subdivisions under each. The first group contained those who were absolutely *insusceptible* and who consequently were scored 0.

The lightest trance conditions, the *hypnoidal*, are characterized by a subjective sensation of drowsiness, heaviness of the limbs,

TABLE I

HYPNOTIC SUSCEPTIBILITY SCORING SYSTEM

Debt	Score	Objective Symptoms
Insusceptible	0	
Hypnoidal	1	
	2	Relaxation
	3	Fluttering of lids
	4	Closing of eyes
	5	Complete physical relaxation
Light trance	6	Catalepsy of eyes
	7	Limb catalepsies
	10	Rigid catalepsy
	11	Anaesthesia (glove)
Medium trance	13	Partial amnesia
	15	Post-hypnotic anaesthesia
	17	Personality changes
	18	Simple post-hypnotic suggestions
	20	Kinaesthetic delusions; complete amnesia
Somnambulistic trance	21	Ability to open eyes without affecting trance
	23	Bizarre post-hypnotic suggestions
	25	Complete somnambulism
	26	Positive visual hallucinations, post-hypnotic
	27	Positive auditory hallucinations, post-hypnotic
	28	Systematized post-hypnotic amnesias
	29	Negative auditory hallucinations
	30	Negative visual hallucinations; hyperaesthesias

and narrowing of attention; objectively there is the failure of the eyes to keep focused, a fluttering of the lids, and a physical relaxation. These symptoms, as the table shows, were scored from 1 to 5, depending upon their persistence.

In the *light trance*, catalepsy of the eye muscle was used as the criterion of the induction of the trance. It was found that this was one of the first objective symptoms of the trance which could be induced, and unless it appeared no further symptoms of the trance could be brought about. Catalepsies of the limbs, depending upon the success with which they could be induced, were used as the basis for further scoring of this stage of the trance. Additional subjective symptoms occasionally were reported by the subjects; the lethargy with characterized the lighter hypnoidal condition was replaced by lightness, and increasing drowsiness was noticed. Dissociation at this stage was far from complete, however, and no amnesia was observable.

In the *medium trance* state sensory anaesthesias can be induced in the trance, but ordinarily do not remain post-hypnotically. The anaesthesia is not profound, but is usually reported as a diminution of sensitivity over the area suggested. Post-hypnotic suggestions can be successfully produced in this stage, provided they are of a simple and logical nature. A partial amnesia is characteristic. Ordinarily the subject remembers vaguely what was said to him in the trance.

In the deepest, the *somnambulistic*, stage of the trance, a complete amnesia was used as the criterion. Post-hypnotic suggestions of the most bizarre order are meticulously carried out; the subject can open his eyes, talk, walk about, and behave naturally without the trance depth being affected in the least. All manner of hallucinations are possible, those of a kinaesthetic nature being the most readily induced, both in the trance and post-hypnotically. Auditory and visual hallucinations may be induced with almost equal facility, although negative visual hallucinations post-hypnotically induced seem to be the most difficult.

It must be admitted that the use of a quantitative index is necessarily arbitrary. However, the symptoms ordinarily occur in a certain sequence, and we have been unable to find any evidence for possible "critical points" which might indicate progress of hypnosis to be qualitative, that is by large steps rather than by gradual increments.

TECHNIQUE

The method of inducing the trance is the most important consideration. In any hypnotic experiment so much of the success depends upon both the personality of the operator and the technique used in inducing the trance that standardization is essential for the results to be at all reliable.

So far as possible external conditions were controlled. All subjects were hypnotized in the same room, under exactly the same conditions of light, warmth, and comfort. No persons other than the operator and the subject were permitted in the room while an experiment was being conducted. In nearly every case the first trials were conducted in the late afternoon. The operator's remarks were, within limits, also standardized.

The subjects were hypnotized after the method of Braid, through the fixed gaze technique. Coöperation was, of course, essential to the successful induction of the trance, and in all but three cases it was obtained. In inducing the trance no suggestions were made until the lids began to flutter and the pulse rate, observed from the throat arteries, slowed to normal. It was noticed that all the subjects, most of whom were quite naïve concerning hypnosis, were at first somewhat excited and anxious. Therefore it seemed best to awaken the subject almost immediately after the first trance states had been obtained. The subject's confidence in the operator sometimes wavers if this is not done; occasionally the first venture into a trance frightens a person, and any difficulty which might have been encountered in awakening a subject from a deep trance state is avoided through this careful training.

The symptoms were suggested separately, usually in the order in which they appear in Table I. If one symptom could not be induced despite repeated suggestion, the next more difficult was attempted; but, as was previously mentioned, it was only very rarely that the more difficult suggestions were successful when the simpler ones had failed. In the trance, training plays such a large part in the success with which the operator can induce successively deeper states that it is absolutely necessary for one to proceed from the simple to the complex; for if a difficult suggestion fails, it is with much greater difficulty that even a simple one may succeed afterward.

In inducing symptoms the same phenomena were always suggested. Catalepsies of the eye were attempted first, then of the arm and leg, and then of total muscular rigidity. Post-hypnotic suggestions ranged from a simple act like crossing the legs or getting up and turning out the light, to such complex behavior as calling the experimenter on the phone the noon following the conclusion of the experiment, or eating dinner only with the left hand. Glove anaesthesias alone were attempted, with sensations of touch, pain, pressure, and kinaesthesis removed. Visual hallucinations ranged from the sound of the class bell in the hall to whole

conversations carried on between visually hallucinated fairies who sat upon the edge of the table. Post-hypnotic aphasias and agraphias were attempted in several cases with good results; automatic writing was successfully carried out in three cases; and post-hypnotic intoxication was successful in seven out of ten cases.

The intelligence test was given in groups whenever possible, and some of the personality tests. However, scoring was not done until after the hypnotic tests were run, in order that any possible bias on the part of the operator might not arise.

RESULTS

The experimentation was, on the whole, rather lacking in positive results. Table II gives the correlations between the various personality traits and hypnotic susceptibility. The only trait which shows an appreciable correlation at all for both groups is intelligence, and even here it is so low that the test could not be

TABLE II

CORRELATIONS BETWEEN HYPNOTIC SUSCEPTIBILITY AND PERSONALITY TRAITS

Trait	Men	Women
Intelligence	.37 ± .06	.31 ± .06
Maladjustment	—.05 ± .12	.14 ± .11
Introversion	.05 ± .12	.23 ± .07
Prejudice	—.01 ± .12	—.02 ± .12
Affectivity	.06 ± .12	—.18 ± .09

used with any degree of reliability of prediction, particularly for individual cases. For women the coefficient of +.23 indicates a slight relation between introversion and susceptibility, but it is highly uncertain and may easily have been due to chance.

The correlation between intelligence and susceptibility seems reasonably valid. A subject who can not fix his attention on one thing for any length of time cannot be successful either in a time-performance test or as a hypnotic subject. The difficulty in both cases is probably as much emotional as intellectual, but since the extent of emotionality as measured by the Pressey test correlated only .19 with intelligence, we have no objective evidence for this opinion.

Data given by groups, in the manner of Table III, often show trends more clearly than the correlation coefficient alone.

It is evident from an inspection of this table that a distinct sex difference exists on this test. The affectivity scores are seen to decrease with intelligence for the men, but with women they go with lack of intelligence. Further inquiry into this matter should prove enlightening.

TABLE III

RELATION BETWEEN INTELLIGENCE AND AFFECTIVITY

Group	Affectivity Score	
	Men	Women
Six most intelligent	194	144
Mean: 30 men, 25 women	188	159
Six least intelligent	177	166

Concerning the claim of Pierre Janet that susceptibility is linked with neurotic tendencies (2) the evidence is entirely negative, as shown by the correlation of —.05 between susceptibility and the Thurstone Personal Inventory Schedule. This provided, of course, that we assume both measures to be reasonably valid.

The very slight positive correlations between introversion and hypnotic susceptibility lend no support to the hypothesis of Bernheim and the Nancy school, that an introvert makes a better subject. The correlations are so insignificant that they can not be construed as even indicative. Suggestibility has been assumed to be dependent upon introversion, and since nearly all writers conclude that the trance is essentially a matter of heightened suggestibility, either the hypothesis is incorrect or the test does not measure introversion.

The lack of correlation (—.01) between fairmindedness as measured by the Watson test and susceptibility shows that either prejudice has nothing to do with success as a hypnotic subject or else that it is so specific that a general test of this nature would not uncover it.

The absence of any significant correlation between affectivity and susceptibility is evidence against the psychoanalytic theory concerning hypnotic predisposition (Freud, 3). In five somnambulistic cases studied, the sexually connotative words in the Pressey test which were crossed out formed only 21 per cent of the total. In five other cases, picked at random, the results were practically the same—23 per cent.

A comparative study of the sexes in regard to hypnotic susceptibility and personality traits should prove interesting. Table IV shows the differences among the quartiles for both men and women in regard to susceptibility.

It will be noticed from a comparison of the mean scores for the two groups that the women rank considerably higher than do the men in intelligence. The mean percentile score for the men is 82, while that for the women is 96. This variation can be explained by the fact that most of the women were upper-classmen, while some of the men were freshmen in college.

TABLE IV

PERSONALITY TRAIT AVERAGES BY QUARTILES OF SUSCEPTIBILITY SCORES

Trait	Men			Women		
	Lower 25%	Mean	Upper 25%	Lower 25%	Mean	Upper 25%
Intelligence	181	208	224	237	241	257
Maladjustment	57	41	39	53	54	51
Introversion	620	605	629	37	348	165
Prejudice	140	132	140	123	120	105
Affectivity	182	188	198	123	159	147

The fact brought out by the correlation between intelligence and susceptibility is again obvious here; the most intelligent persons are generally the most susceptible to hypnosis. There are a few exceptions to this generalization, of course. For example, the subject who made the highest intelligence score showed susceptibility of only 3; on the other hand the second most intelligent subject rated 25 on the scale.

In regard to introversion the experimentation brought some interesting results to light. A distinct sex difference is evident; the most susceptible men are unusually introverted, while the most susceptible women are highly extraverted. However, the least susceptible men are also more introverted than the average, and correspondingly the least susceptible women score more toward the extravert end than their average.

The affectivity distribution for women shows the same bimodal tendency, although the correlation of —.18 shows an inverse trend quite opposed to the Freudian viewpoint. The slight upward trend for men indicated in the table is more or less in line with the Freudian point of view, but is largely offset by the inconclusive correlation of +.06.

It was found that a large percentage of subjects studied were susceptible to at least the lighter stages of the trance. Table 5,

TABLE V

HYPNOTIC SUSCEPTIBILITY FREQUENCIES

Trance State	Scale	Percentages		
		Men	Women	Total
Insusceptible	0	13	4	9%
Hypnoidal state only	1– 5	30	28	29
Light trance	6–10	17	20	18
Medium trance	11–20	10	20	15
Somnambulistic trance	21–30	30	28	29

following, shows the percentages in the various groups formed by classing the subjects in accordance with the stage of trance to which they proved susceptible. These figures give us the facts that from an unselected sample of college students, 9 per cent were unwilling to permit the operator to hypnotize them, 43 per cent

were susceptible to trance states deeper than that required to produce anaesthetic phenomena, and 29 per cent were somnambuls. These percentages, while not as high as those reported by some psychiatrists, indicate that at least two persons out of five are susceptible to the deeper hypnotic states and that one in five will display all possible symptoms.

The susceptibility percentages reported by Bernheim range as high as 90 per cent, but his uniformly successful induction of the trance probably depended in large measure upon his remarkable reputation and upon his selective sampling. The results found here are, we believe, more nearly general and probably would vary but little with more extended investigation.

SUMMARY

This paper has been devoted to a study of the relation of various personality traits, as measured by several well known tests, to hypnotic susceptibility as measured upon a specially devised scale.

Fifty-five subjects were used in the experiment, twenty-five women and thirty men. It was found that 43 per cent were susceptible to the medium and deep trance states, while 29 per cent fell into somnambulistic trances. No significant sex differences in susceptibility were observed.

A correlation of +.34 between susceptibility and intelligence was obtained as a result of the investigation. No other correlation, except possibly one of +.23 between susceptibility and introversion in women, had any significance at all. Tabular results brought out the fact that there was a distinct sex difference in the relation of affectivity to intelligence: it appears to be positively correlated with intelligence with men, but negatively with women.

The results of the study tend to refute the claims of Janet that susceptibility to hypnosis is dependent upon neurotic traits, as neither the correlations nor the tabular data disclosed any significant relations along this line.

The Freudian assumption, that sexuality is related to susceptibility, likewise furnished distinctly negative results. Also the claim of the Nancy school that hypnosis is simply a matter of suggestibility was studied, but with indifferent results.

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2. Janet, P. Psychological Healing, 1925.
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DECEPTION: A STUDY IN FORENSIC PSYCHOLOGY

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INTRODUCTION

DEAN POUND has pointed out that in "prevention, in criminal investigation as a preliminary to prosecution, in the trial of issues of fact and in penal treatment we have much to learn from the physician and psychologist and psychopathologist".[1] That the defective administration of criminal justice is one of the paramount problems of our day is a truth hardly necessitating categorical proof;[2] that the legal profession has begun to lend a receptive ear to the scientific contributions of psychologists and psychiatrists may be a significant indication of their influence on the law of the future.[3]

One of the many studies psychologists have so far undertaken is that of the deceptive witness. The problem of the deceptive witness, as affecting proof in criminal cases especially, is of as great criminological as legal importance. The introduction of reliable and practical scientific methods of deception detection would contribute to the gradual elimination of that medieval atavism known as the "third degree" as a method of eliciting truth[4] and would render it unnecessary for prosecutors to sometimes accept compromise pleas in the hope of securing substantial, if not real, justice.[5] In so doing they would help elevate the administration of criminal justice to a plane more in keeping with

[1] Pound, Roscoe, "Criminal Justice in the American City," Part 7 of the Cleveland Foundation Survey of Criminal Justice in Cleveland, 1922, p. 30.

[2] Pound, Roscoe, "First among the problems of the day, by general consent, is the administration of criminal justice . . ." Excerpt from an address to the Chicago Bar Association on Nov. 12, 1925, quoted in "Our Civilization and Its Problem of Crime," American Bar Association Reports for 1926, Vol. 51, p. 696.

[3] Ibid., quoting Pound, ". . . the lawyer can do little until long continued, thorough, *scientific research* has given an assured basis on which to work . . ."; supra, note 1; it is more than mere coincidence that in 1927 the American Bar Association set aside a session to be devoted to psychiatry, and changed the name of its section on "Criminal Law" to "Criminal Law and Criminology"; Adler, H. M., "The Interests of Psychiatry in Criminal Procedure," American Bar Association Reports for 1922, Vol. 47, p. 629 ff. "A recognition of something of this sort is probably to be found in the increasing interest manifested in the results of the scientific study of human behavior and in the application of some of the first tentative deductions in the field of criminology."

[4] Larson, J. A., "Present Police and Legal Methods for the Determination of the Innocence or Guilt of the Subject," Journal of the American Institute of Criminal Law and Criminology, 1925–6, Vol. 16, pp. 219–271.

[5] Moley, R., "The Prosecutor and the Plea of Guilty," American Bar Association Reports for 1928, Vol. 53, pp. 541–555.

the ideals and sentiments of a modern people. It is not urged that any or all of the techniques to be surveyed offer a panacea; nor is it for a moment believed that their eventual practicability and general adoption are significant indications of an approaching millenium in which the scientific knowledge of the human being will have its place in the law itself as well as in its administration. It has merely been attempted to survey the paths along which progress has been made in the study of deception as a criminological phenomenon and in the refinement and interpretation of techniques for its detection.

II.

The theory that the lie has its basis in a commandment inscribed in golden letters on the walls of churches and schools is an unconscionable claim of moralists and pedagogues which has no justification in scientific fact.[6] Yet its influence on the course of occidental legal and ethical theory can hardly be overestimated. Our distinctions in law and morals between right and wrong, good and evil, true and false, have their basis in it. The theory presupposes that every individual is endowed by the creator with a free will enabling him to distinguish between these various divine antipodes and to act upon such distinctions. Without this presupposition the theory fails. It is submitted that a free will in this sense does not exist. Under a theory based upon free will a lie is solely a psychological phenomenon. Recent developments in biological science demonstrate that it may be at one and the same time a pathologic, psychophysiologic, and psychosociologic phenomenon; that it is due to specific tendencies which are bound up with individual character, temperament, physiological constitution and neuromuscular activity.[7] A parallel development in social science is attempting to show the relationship of these supposedly divine and absolute antipodes to the social and antisocial conventions of their day with a view of demonstrating their relativity as conventions in the social consciousness rather than absolutes in the divine consciousness. As a consequence it is commencing to appear as if the scientific world is ready to subscribe to the Nietzschean theory that "With regard to what 'truthfulness' is, perhaps nobody has ever been sufficiently truthful."[8]

[6] Duprat, Le Mensonge: étude de Psychosociologie, quoted in J. H. Wigmore—Principles of Judicial Proof, pp. 377–387, Boston, 1919.

[7] Ibid.

[8] Nietzsche, F., Beyond Good and Evil, Apophthegm 177, p. 101, translated by Helen Zimmern, London, 1914.

The psychophysiological character of deception, although unknown to western civilization up to a few generations ago, has for centuries been a matter of common knowledge in the orient. In one of the deception tests used there the accused is asked to chew rice and spit it out. If the rice is dry the accused is deemed guilty, the belief being that the fear of the guilty prevents the natural flow of saliva. In India it was long believed that the movement of a witness' big toe was an indication of deception.[9] Crude as these methods undoubtedly are for the detection of deception they are at least cognizant of its physiological basis. Although it is as yet unknown whether or not the retardation of the salivary flow or the movement of the big toe are symptomatic of deception, it is definitely known that the former may be indicative of great emotional tension. And since deception is accompanied by emotional disturbances it is by no means improbable that these symptoms of emotion may be at the same time symptoms of deception. The superiority of these techniques over the various types of ordeals, though they antedate the latter by many centuries, can be fully appreciated, however, only after one has surveyed the recent developments in forensic psychology.

The significance of the emotions in the determination of guilt never occurred to the medieval mind. To the medievalist true or false, with their various ethical corollaries such as good or evil, right or wrong, pure or foul, were decisive as legal proof of an individual's innocence or guilt. Thus in one of the ordeals the suspect was bound and thrown into a pool of fresh water. If he sank, this was proof of his innocence, the theory being that fresh water accepts only pure bodies; if he floated, this was irrefutable proof of guilt, the theory being that pure water does not suffer foul bodies to contaminate it. Under another ordeal the suspect was required to plunge his right arm into a cauldron of scalding water. Upon removal the arm was bandaged and inspected after three days. If the burns were healing this was legal proof of the suspect's innocence and purity; if the arm was beginning to fester this was undeniable proof of guilt and foulness. In all medieval tests of innocence or guilt, whether based on the ordeal or not,[10] there

[9] Larson, J. A., "The Berkeley Lie Detector and other Deception Tests," American Bar Association Reports for 1922, Vol. 47, pp. 619–628, at 619.

[10] In the *Wager of Law* the party on whom the burden of proof rested was obliged to have his compurgators swear to the truth of his contentions by repeating a prescribed formula. If one deviated in the slightest from the orthodox manner of pronouncing the formula, the party interested in the outcome of the suit on whom the burden of proof rested lost the case. This exemplifies in the highest degree the *absolute* character of truth to the medieval mind. In the *Wager of Battle* the victor received judgment in his suit, not on the theory that to the victor belongs the spoils, but because the righteous always triumphs over the wicked.

is not the slightest disposition to accommodate legal proof to the exigencies of human nature. The moral dichotomies with all their *a priori* religious connotations formed the bases of legal proof for an experiential world.

With the growth of empirical thought, especially in England, during the ensuing centuries it was to be expected that more practical consideration would be given to the phenomenon of mendacious invention with the view of establishing the physiological processes on which it rested. English philosophers from Locke, Hume and Berkeley to Mill, Bain and Spencer sought an explanation in the supposed laws of mental association. At most they merely described certain facts such as the creation of syntheses of representations from the contiguity, resemblance, or contrast of various perceptions.[11] Their descriptions of behavior merely summed up the diverse observations of many people, of folk-lore and tradition, of literary opinion and common sense.

It remained for the twentieth century to produce the first scientific method for the detection of deception.[12] In 1904–5 Jung[13] and Wertheimer[14] began publishing an extremely significant series of studies in free association as a technique of diagnosis.[15] The method is simple enough; the interpretation of

[11] Supra, note 6.

[12] It is true that during the last quarter of the Nineteenth Century the plethysmograph was used to record changes in blood volume and pulse and the sphygmograph to detect deception by means of pulse tracings but these techniques were not developed to the point where results were of much practical importance. The psychogalvanic tests measure the electrical body currents. The results have been found to vary greatly with the varying emotions of the subject. This test is of little value in detecting deception since the instrument registers nearly every emotion experienced by the subject during the examination and makes it impossible to distinguish the emotional reactions caused by deception. Marston, W. M., "Psychological Possibilities in the Deception Tests," Journal of American Institute of Criminal Law and Criminology, 1920–1, Vol. 11, pp. 551–570; see Larson, J. A., "The Cardio-Pneumo-Psychogram and Its Use in the Study of the Emotions, with Practical Application," Journal of Experimental Psychology, 1922, Vol. 5, pp. 323–328. Same author, "The Cardio-Pneumo-Psychogram in Deception," same journal, 1923, Vol. 6, pp. 420–454. Association-reaction was investigated by Francis Galton in 1879, Cattell in 1887, and Cattell and Bryant in 1889, but Jung, whose investigations date from 1905, claims priority because he developed the technique and first suggested its use in criminal investigations. Crane, H. W., "A Study in Association Reaction and Reaction Time With an Attempted Application of Results in Determining the Presence of Guilty Knowledge," Psychological Monographs, 1915, Vol. 18, No. 4, pp. 1–75, at p. 4 ff.

[13] Jung, C. J., "Diagnostische Assoziationsstudien," Journal für Psychologie und Neurologie, 1905–6, Vol. 4, pp. 1–36; "Diagnostische Assoziationsstudien," same journal, 1906–7, Vol. 6, pp. 1–24; "The Association Reaction Method," American Journal of Psychology, 1910, Vol. 21, pp. 219–240.

[14] Wertheimer, M., and Klein, J., "Psychologische Tatbestandsdiagnostik," Archiv für Kriminal Anthropologie und Kriminalistik, 1904, Vol. 15, pp. 72–113; "Experimentelle Untersuchungen zur Tatbestandsdiagnostik," Archiv für die gesamte Psychologie, 1905, Vol. 6, pp. 59–131.

[15] Jung and Wertheimer were the most prominent of the psychologists belonging to the Bleuler-Freudian school. Klein, Riklin, and Wehrlin were members also.

results extremely difficult. The subject is asked to respond as quickly as he can with the first word that occurs to him to each of a list of stimulus words and the length of time it takes him to respond to each word is measured. It was early discovered that some individuals responded faster than others so that the reaction-times could not be uniform. But an average reaction-time can be established for each subject by presenting a list of harmless stimulus words which are not intended to provoke a deceptive response or disturb an emotional complex. When this has been established a new list of stimulus words is read to the subject among which there are scattered a number of dangerous or crucial words. Jung noted marked coincidences between the lengths of certain reactions and the presence of emotional complexes. These *Komplexmerkale* were in the main unearthed by words which the investigator denominated as crucial or dangerous. Although this technique was primarily applied to the diagnosis of the emotional complexes underlying cases of hysteria and neurasthenia, the method was applied by Jung and Wertheimer, as well as by numerous American investigators,[16] in attempts to detect guilt.[17]

Admitting the good use to which this technique has been put it can hardly be denied that it has been fashionable in some circles to exaggerate its real importance.[18] There are innumerable points concerning the interpretation of the data on which there is no decisive evidence whatever despite their obvious clinical and criminological importance. Do all or only some of these *Komplexmerkale* really indicate emotional complexes? And of those which do, how strong are the strongest and how weak the weakest? Does a long reaction-time deserve the prominence given it? What importance has short reaction-time in diagnosis? Assuming that long reaction-time really indicates the presence of a complex or deception, how long must it be in order to do so?[19]

The inefficacy of this technique to detect all deceptive wit-

[16] Yerkes, R. M., and Berry, C. S., "The Association Reaction Method of Mental Diagnosis," American Journal of Psychology, 1909, Vol. 20, pp. 22–37; Henke, F. G., and Eddy, M. W., "Mental Diagnosis by Reaction Method," Psychological Review, 1909, Vol. 16, pp. 399–409; Crane, H. W., supra, note 12.

[17] Goldstein, E. R., "Reaction Times and the Consciousness of Deception," American Journal of Psychology, 1923, Vol. 34, pp. 562–581, at p. 581. "Consciousness of deception appeared as feeling of strain, self-consciousness, hesitation, conflict of impulses, and emotional disturbances."

[18] Wigmore, J. H., "Professor Muensterberg and the Psychology of Testimony," Illinois Law Review, 1909, Vol. 3, pp. 399–435. Professor Wigmore's article is devoted to the supposititious case of Cokestone vs. Münsterberg, in which he jocularly reduces Professor Münsterberg's unjustified pretensions for the use of the association-word technique in court procedure to thin air. The appendix contains an exhaustive list of the literature on this method up to 1907.

[19] Crane, H. W., supra, note 12.

nesses was only recently pointed out by the investigations of Marston.[20] He discovered the existence of a negative type of witness, *i.e.*, a deceptive witness whose reaction-time to crucial and non-crucial situations cannot be distinguished. Subjects of negative type gave little indication of fear, were able to regulate their tension by voluntary relaxation, their behavior was almost wholly calm and confident, and they showed a high degree of intellectual concentration. They were, in truth, representatives of a type who "through the centuries, has had the joke on lawyers and juries".[21] Is it not peculiar that we did not hear of this negative type subject before Marston's investigations? Close investigation of the quantitative results of Washburn and Leach[22] and Yerkes and Berry[23] will reveal instances of this unrecognized type. It is entirely probable that witnesses of this type remained undiscovered because they "were wiped out in the general averages and left unaccounted for when experimenters reported as their final net result a certain percentage of cases successfully detected by reaction-time".[24]

What, then, is the status of this association-reaction-time technique? Although it leaves much to be desired it cannot be denied that it has been used to good advantage. Especially in cases of clinical importance where intelligent subjects have realized a maladjustment of some kind and have voluntarily solicited the aid of a psychiatrist has it been successfully used in unearthing subconscious emotional complexes. But as an instrument of criminological technique it has but limited efficacy. Its criminological significance lies not so much in practical accomplishment as in its pioneer work as the first of modern scientific deception techniques.[25]

It became apparent that a more successful method of guilt detection would have to give greater emphasis to quantitative results. The lengths of reaction-time were the sole quantitative determinations of the association method and no two investigators

[20] Marston, W. M., "Reaction Time Symptoms of Deception," Journal of Experimental Psychology, 1920, Vol. 3, pp. 72–87.

[21] Ibid., at p. 83.

[22] Washburn, M. F., and Leach, H. M., "Some Tests by the Association Reaction Method of Mental Diagnosis," American Journal of Psychology, 1910, Vol. 21, pp. 63–67.

[23] Yerkes, R. M., and Berry, C. S., "The Association Reaction Method of Mental Diagnosis," American Journal of Psychology, 1909, Vol. 20, pp. 22–37.

[24] Supra, note 20, at p. 80 ff.

[25] Jung appreciated this. In 1906, in replying to Lederer's criticism, he declared "that the psychological diagnostic, at least as yet, is thoroughly unsuitable for criminal practice. . . ." Quoted by J. H. Wigmore, supra, note 18; Crane, H. W., supra, note 12.

were agreed on the interpretation of this data. Neither were they enlightened as to the physiological processes involved. The quantitative results were merely arithmetical descriptions of a subject's overt linguistic behavior. The problem, then, was to reduce the physiological processes involved in deception to definite quantitative measurement.

The investigations of Benussi, a German psychologist, marked the first milestone in this direction.[26] He studied the effect of lying on respiration and reported that the average ratio of inspiration to expiration preceding a false answer was less than the average ratio following that answer. This characteristic ratio was symptomatic of an "internal excitement" caused by lying. Moreover—and this seems at first surprising—he found this "internal excitement" to be much stronger in clever liars than in those easily detected. That is, those suspects whose reaction-times were shortest and were therefore included in the negative type discovered by Marston showed the greater "internal excitement." The interpretation of this phenomenon is reserved until later. These results were obtained with a pneumograph which was strapped to the subject's chest and a kymograph on which the respiratory changes were registered. The results have been confirmed by other investigators[27] in which more refined instruments were used.[28] Burtt, an American investigator, found that the technique was accurate in only 73 per cent of the cases.[29]

Benussi left many troublesome questions unanswered. It is true that his quantitative results indicated definite symptoms of the "lying complex" to justify "the assumption of the uniformity of the deceptive consciousness as a working hypothesis."[30] But what were the physiological reactions involved in deception and causing the "internal excitement"? Did they approximate uniformity in all individuals? Were they capable of measurement? What were the psychological factors involved in the deceptive

[26] Benussi, V., "Die Atmungssymptome der Lüge," Archiv für die gesamte Psychologie, 1914, Vol. 31, pp. 244–273.

[27] Burtt, H. E., "The Inspiration-Expiration Ratio During Truth and Falsehood," Journal of Experimental Psychology, 1921, Vol. 4, pp. 1–23.

[28] Burtt, H. E., "A Pneumograph for Inspiration-Expiration Ratios," Psychological Bulletin, 1918, No. 15, pp. 325–328; "Further Technique for Inspiration-Expiration Ratios," Journal of Experimental Psychology, 1921, Vol. 4, pp. 106–110.

[29] Supra, note 27; Marston, W. M., supra, note 12. "This test was used by the writer, assisted by Dr. H. E. Burtt, in certain criminal courts in 1918 at the request of the Psychological Committee of the National Research Council. Certain results were obtained having psychological interest, but not susceptible of sufficiently definite analysis to prove legally acceptable."

[30] Marston, W. M., "Systolic Blood Pressure Symptoms of Deception," Journal of Experimental Psychology, 1917, Vol. 2, pp. 117–163.

consciousness? The answers to these questions were being sought at the time in experiments conducted in the Harvard Psychological Laboratory. Benussi's investigations in inspiration-expiration time merely gave renewed poignancy to questions which had long vexed psychologists. In seeking their answers the psychologist sought the aid of the physiologist.

Cannon's researches into the workings of the autonomic division of the nervous system disclosed many interesting and highly important facts. His investigations disclosed that emotional reactions were by no means willed movements to which an individual could react as he saw fit. In fact, as he pointed out, these responses " are often distressingly beyond the control of the will".[31] Even in those situations in which it was possible for an individual to suppress with stoical fortitude the customary overt emotional response it was found that the internal or visceral reactions took place and were in some cases susceptible of quantitative measurement. The investigator of deception techniques was heartened by these findings. It meant that he was no longer to be deceived by outward appearances.

Cannon localized the emotional patterns of fear, rage, and pain, which were generally conceded to be the strongest and most violent of emotions since they involved the individual's self-preservation, to that section of the central nervous system known as the thoracicolumbar or sympathetic.[32] Investigators perceived in the emotion fear the most common accompaniment of deception. The criminal's fear of detection and of the natural consequences following detection were the prime reasons for concealing the truth upon examination. Now that they knew the physiological accompaniments of fear it was only necessary to devise appropriate methods for measuring the visceral reactions of a suspect under examination. Such was the general argument. But the path was beset with obstacles which had to be eliminated before a practical method for obtaining quantitative measurements of the psychophysiological symptoms of the deceptive consciousness could be unqualifiedly accepted. How did we know that the fear of detection, assuming that it existed, was a stimulus of sufficient strength to produce the physiological reactions obtained in more violent manifestations of fear? And assuming that these reactions were obtained were we certain that they were not caused by rage

[31] Cannon, W. B., "The Interrelations of Emotions as Suggested by Recent Physiological Researches," American Journal of Psychology, 1914, Vol. 25, pp. 256–282, at p. 263.

[32] Ibid., p. 261 ff.; Bodily Changes in Pain, Hunger, Fear and Rage, Appleton, 1920.

or pain or by any number of other emotions such as sex-excitement, intense sorrow, intense joy, or intense disgust which, "when they reach a sufficient level of intensity, break over into the sympathetic channels"! [33]

It is difficult to venture an explanation as to why psychologists were so willing to climb over these obstacles without eliminating them from the road. Perhaps, like the Freudians, they felt that the end justified the means. They tacitly assumed that fear was the emotion common to deception and from this rationalized that the quantitative results obtained must be the result of fear. Even Marston who, as will be shown later, was aided in formulating a new theory of the emotions as a result of investigations in deception, termed the emotion thus revealed "fear", as he says, following "the terminology current among physiologists and psychologists".[34] Although the visceral changes in rage and fear are identical—"more rapid heart beat, the redistribution of the blood, the increase of the red corpuscles in the circulation, the deeper ventilation of the lungs, the dilation of the bronchioles, the liberation of sugar from the liver, the secretion of adrenin with its favorable action on fatigued muscles" [35]—Marston, like other investigators who were attempting to point out some physiological distinction between the two in order to fortify the theory that fear was the accompaniment, could only report as a distinction that in fear there was a long and gradual rise in blood pressure whereas in rage it was shorter and more abrupt.[36] And this finding has never been corroborated.[37]

Postulating fear, then, as the emotion indicated by deception Marston utilized Cannon's researches in developing a new deception technique which he termed the systolic blood pressure test. Cannon had reported that a more rapid heart action, among various other visceral changes enumerated above, resulted from sympathetic innervation. Since cardiac change was the easiest

[33] Ibid.; Cannon, W. B., Britton, S. W., Lewis, J. T., and Groeneveld, A., American Journal of Physiology, 1927, Vol. 79, p. 433; on exposure to cold—Cannon, W. B., Querido, A., Britton, S. W., and Bright, E. M., American Journal of Physiology, 1927, Vol. 79, p. 466; when the blood sugar is too greatly reduced—Cannon, W. B., McIver, M. A., and Bliss, S. W., American Journal of Physiology, 1927, Vol. 79, p. 46; in asphyxial states—Cannon, W. B., and Carrasco-Formiguera, R., American Journal of Physiology, 1922, Vol. 61, p. 215.

[34] Marston, W. M., Emotions of Normal People, 1928, p. 369 ff.

[35] Cannon, W. B., "Neural Organization for Emotional Expression," Wittenberg Symposium on Feelings and Emotions, 1928, p. 257.

[36] Marston, W. M., "Sex Characteristics of Systolic Blood Pressure Behavior," Journal of Experimental Psychology, 1923, Vol. 6, pp. 387–419, at p. 414.

[37] Dashiell, J. F., "Are There any Native Emotions?", Psychological Review, 1928, Vol. 35, pp. 319–327, at p. 322.

to measure Marston decided to use it as his indicator.[38] A sphygmomanometer was attached to the suspect's arm and his blood pressure was recorded five times during the course of the experiment. Like in the psychogalvanic (see note 12) and in inspiration-expiration experiments the association word technique was used to evoke the emotional responses. Many variations of this systolic blood pressure technique have been evolved. Such investigators as Langfeld,[39] Marston,[40] Burtt,[41] and Larson[42] have used the blood pressure technique in conjunction with measurement of reaction-time and inspiration-expiration. Larson has christened his blood pressure-breathing-reaction-time device "cardio-pneumo-psychogram." Not only has he been fortunate in his choice of a name which is truly descriptive but the methods of measuring both blood pressure and breathing are themselves more descriptive of the physiological changes taking place. Whereas Marston obtained his data by taking five periodic readings of the suspect's blood pressure, Larson's technique consists of securing a continuous blood pressure curve taken synchronously with a respiratory curve, both of which are recorded on a revolving kymograph. Not only are the results obtained by this method more readily interpreted but the graphic records may be preserved for future reference.

The systolic blood pressure technique is admittedly the most expert yet devised for detecting the psychophysiological symptoms of deception. The investigators who have used it report from 90[43] to 97[44] per cent accuracy in diagnosis. These results are little less than remarkable when it is remembered that they represent in the main experiments conducted in the laboratory where the surrounding conditions and the attitude of the suspects themselves, who are usually students participating for

[38] Marston, W. M., "Systolic Blood Pressure Symptoms of Deception," Journal of Experimental Psychology, 1917, Vol. 2, pp. 117–163, at pp. 121–122. The author proposed the following reasons for selecting systolic in preference to diastolic blood pressure: ". . . the systolic eleminates the local effects of minor affective states; secondly, it eliminates the unimportant and irrelevant factor of intellectual work; thirdly, it is less susceptible to modification by physical pain than is the diastolic; and fourthly, it tends to record only the unequivocal changes in the blood pressure system brought about through increase of heart-beat unimpeded by inhibitory reflexes or antagonistic functioning of the vasomotor apparatus."

[39] Langfeld, H. S., "Psychophysical Symptoms of Deception," Journal of Abnormal Psychology, 1920–1921, Vol. 15, pp. 319–325.

[40] Supra, note 38.

[41] Burtt, H. E., "The Inspiration-Expiration Ratio," Journal of Experimental Psychology, 1921, Vol. 4, pp. 1–23.

[42] Larson, J. A., "The Cardio-Pneumo-Psychogram in Deception," supra, note 12.

[43] Burtt, H. E., supra, note 41; Larson, J. A., supra, note 12.

[44] Marston, W. M., "Psychological Possibilities in the Deception Tests," supra, note 12.

the "fun of it", are hardly as conducive to emotional excitation as a police station or crowded court room. But the technique should not be trusted from the hands of the expert. A suspect whose blood pressure fails to rise on examination may still have guilty knowledge of an act for which he is being examined despite total absence of a consciousness of deception. This is true in cases of psychosis, especially of hallucinations and delusions, "which carry a degree of conviction as to their reality which precludes changes in blood pressure, pulse rate, or respiration which invariably accompany conscious deception."[45] In like manner a rise in blood pressure may be caused by the unearthing of an emotional complex in no way related to a consciousness of deception.[46] It is obvious that when cases such as these present themselves, and no one can forecast when they will, competent and trained hands must be prepared to deal with them. In saying this I am not unmindful of the good use to which this technique has been put by such men as Keeler, Sloan, Waterbury, Greening, Wilson, Vollmer, Home, among many others, who are not trained psychologists.[47]

It seems to the writer that the foregoing discussion illustrates the following especially significant facts:

(1) that investigators with one exception have assumed that all deceptive witnesses react similarly;[48]
(2) that Marston's investigations disclosed at least two types of deceptive witnesses;
(3) that the positive type witness shows longer reaction-times than the negative type;
(4) that the negative type shows higher and more consistent increases in breathing and blood pressure curves than the positive type;
(5) that all deception techniques have *assumed* that fear is the basic emotion involved in deception without *proving* such to be the case.

The conclusion may be stated in this form: Fear has failed to establish a logical foundation upon which to interpret the data furnished by the various deception tests for the assumption of it

[45] Adler, H. M., and Larson, J. A., "Deception and Self-Deception," Journal of Abnormal and Social Psychology, 1927–1928, Vol. 22, pp. 364–371, at p. 371.

[46] It is evident that its clinical possibilities are as great as its criminological.

[47] Larson, J. A., supra, note 4; see McCormick, C. T., "Deception Tests and the Law of Evidence," California Law Review, 1926–1927, Vol. 15, pp. 484–504.

[48] Goldstein, E., supra, note 17. Goldstein, like Marston, discovered negative type witnesses. She attributed them, however, to the failure of the experimental setting to produce deception. Her analysis must be erroneous for these negative type witnesses whose responses, according to her, were "a type of non-deceptive response", actually show a higher blood pressure curve than the positive type witnesses.

as a basis presents the unresolvable inconsistency that a clever witness of the negative type (also, vice versa) shows more fear than the positive witness when subjected to the breathing and blood pressure tests but less fear when subjected to the reaction-time test *although all of these tests are administered simultaneously.*

III.

It will have become apparent ere now, particularly in the search for the visceral core of fear in the systolic blood pressure tests, that a marked behaviorist leaning was evidenced by the investigators. Watson was greatly influenced by Cannon's findings and, treating feelings and sensations with scorn, sought to establish the emotions as intra-organic behavior in which the activity of glands and smooth muscles was paramount.[49] This, as already has been pointed out in regard to fear and rage, could only be done in a general way. It was impossible to ascribe distinctive visceral activities to fear and rage. Watson, as Woodworth has shown, was compelled to describe and justify his three primary emotions in terms of external stimuli and overt behavior patterns with practically no reference to smooth musculature and glandular activities.[50] The overt reactions to various types of stimulation in fact provided his key to the emotions. But Sherman's recent investigations have shown the unreliability of the overt behavior patterns as indicators of specific emotions. His results indicated that a judgment as to an emotion was in part guided by knowledge of the stimulus.[51] There remains but one alternative and that is to define the emotion in terms of the stimulus. We could then look forward to a day, as Marston wittily remarks, when professors of psychology would declaim to

[49] Watson, J. B., Psychology from the Standpoint of a Behavorist, 1919, pp. 195–202.

[50] Woodworth, R. S., "How Emotions Are Identified and Classified," Wittenberg Symposium on Feelings and Emotions, 1928, p. 223, quoting Watson: "The responses are a sudden catching of the breath, clutching randomly with the hands (the grasping reflex invariably appearing when the child is dropped), sudden closing of the eyelids, puckering of the lips, then crying." Bentley, M., "Is Emotion More than a Chapter Heading?", Wittenberg Symposium on Feelings and Emotions, 1928, p. 19: "Leaving purely logical schemata aside, the titles to our emotions generally refer (1) to the situation or context in which the organism is placed . . . and (2) to the bodily indicators of the way in which the individual 'takes' the situation . . . Instead of the emotive experience itself, the first kind of reference gives its setting and the second its indication or symptom. What we call 'expression' of emotion is, in large measure, the 'social indicator' which advertises how the organism is affected." See Dashiell, J. F., supra, note 37.

[51] Sherman, M., "The Differentiation of Emotional Responses in Infants," Journal of Comparative Psychology, 1927, Vol. 7, pp. 265–284 and pp. 335–351; see Dashiell, J. F., supra, note 37.

eager students, "Fear is that psychogalvanic-blood-pressure-breathing-ratio score falling within the middle 50 per cent of the scores made by any given group of subjects exposed to the firegong-electric punishments test, known as Shock U (copies at the book-store, 7 cents each)."[52] I believe it is generally recognized that the behaviorists have failed to contribute a satisfying theory of the emotions.

Nor have the James-Langeites. The investigations of Sherrington,[53] Goltz,[54] and Cannon,[55] among other physiologists, have disproved the sensory-content statement of the James-Lange theory.

It became apparent to Marston that the aforementioned theories of the emotions neither had scientific justification nor did they furnish workable hypotheses with which to interpret the data adduced by the deception techniques.[56] What was good in the old had to be reëvaluated and restated in the light of the new evidence. In a series of articles now published together in book form Marston has drawn upon his fifteen years of experimental and clinical investigations as well as the researches of neurologists, physiologists, psychiatrists and endocrinologists to construct a theory of the emotions which has gone far to dispel the mists that were collected around the subject of the emotions.[57] In the words of a critic it is "the first logical and sensible treatise on emotions that psychology has ever offered."[58] It is, of course, beyond the compass of this paper to undertake an elaboration of this theory.

[52] Marston, W. M., "Primary Emotions," Psychological Review, 1927, Vol. 34, pp. 336–363, at p. 338.

[53] Sherrington, C. S., The Integrative Action of the Nervous System, Sixth Ed., 1920, pp. 16–17.

[54] Goltz, F., "Der Hund ohne Grosshirn," Archiv für gesamte Physiologie, 1892, Vol. 51, pp. 570–615.

[55] Cannon, W. B., supra, notes 31, 32, and 33.

[56] Marston, W. M., "A Theory of Emotions and Affection Based Upon Systolic Blood Pressure Studies," American Journal of Psychology, 1924, Vol. 35, pp. 469–506, at p. 470 ff. In criticising the James-Lange theory Marston says: "Reluctant as I always have been to reject the physiologists' refutation of James' identification of emotion with special groups of sensations, my own results, both introspective and behavioristically considered, made it impossible for me to subscribe to the current James-Lange formula, if I hoped to find a unified interpretation of all the studies before me." For criticism of the behavioristic theory, see supra, notes 50 and 51.

[57] Ibid.; same author: "Sex Characteristics of Systolic Blood Pressure Behavior," Journal of Experimental Psychology, 1923, Vol. 6, pp. 387–419; "The Psychonic Theory of Motor Consciousness," Journal of Abnormal and Social Psychology, 1926, Vol. 21, pp. 161–169; "Motor Consciousness as a Basis for Emotion," Journal of Abnormal and Social Psychology, 1927, Vol. 22, pp. 140–150; supra, note 52. The views expressed in these articles are substantially incorporated in his book, supra, note 34.

[58] Byrne, O., Review of Marston's Emotions of Normal People, Journal of Abnormal and Social Psychology, 1929, Vol. 24, No. 1, pp. 135–138.

It is sufficient that only those parts be touched upon which form the basis for the interpretation of the data furnished by the various deception techniques.

Neurologists and physiologists appear generally agreed that the feeling pleasantness is characterized by a free, unimpeded flow of impulses in the central nervous system whereas unpleasantness is associated with conflicts or mutual interferences between nerve impulses.[59] The investigations of Head and Holmes[60] elaborated on this psychoneurological theory by submitting evidence indicating "that whatever changes in nerve impulse behavior are to be associated with increases of pleasantness and unpleasantness are to be found chiefly upon the motor side of the various reflex arcs involved." Aiding one more element, the psychonic theory of motor consciousness,[61] Marston defined an emotion as "psychonic impulses of motor self and motor stimulus in relationships of mutual alliance or conflict."[62] It is evident from this that there are as many distinguishable emotions as there are distinguishable differences in the relationships of mutual and conflicting impulses. Marston shows, however, that there are four basic types of impulse relationships. These comprise the four primary emotions. Primary in the sense that they are the purest examples of the integrative impulse relationship; not in the sense that they are four definitely distinct and unrelated emotions. They have been descriptively named Dominance, Compliance, Inducement, and Submission. In normal combination they may produce love, passion, desire and appetite among various other emotions. In abnormal combination fear, rage, hatred and jealousy. Now this in no way precludes the presence of fear in any of the deception tests. It merely denies its importance in all the techniques.

What, then, is the characteristic emotion involved in deception? The answer is dominance. It is an emotion "*evoked by an antagonistic motor stimulus of inferior intensity to the motor self of the subject*".[63] It is characterized dominance because of the superiority in strength of the motor self over the motor stimulus. Introspective observations are unanimously agreed that it is "*a feeling of an outrush of energy to remove opposition*".[64]

[59] Herrick, C. J., Introduction to Neurology, 1920, pp. 286–287.

[60] Supra, note 34, at p. 71; Head, H., and Holmes, G., "Sensory Disturbances from Cerebral Lesions," Brain, 1911, Vol. 34, pp. 102–254, at p. 109 ff.

[61] According to Marston, "we become conscious of motor alliances and conflicts *at the time they occur, in the motor synapses*". Supra, note 34, at p. 85.

[62] Ibid., at p. 112.

[63] Ibid., at p. 136.

[64] Ibid., at p. 140.

Thus, in all deception techniques the crucial stimulus word or question when applied to a deceptive witness is met by a marked access of power or, to state it differently, motor self. It is this increase of motor self, manifesting itself in increased systolic blood pressure and breathing, that betrays the deceiver. The cleverer the witness as a deceiver and the more negative his reactions to stimulus words, the more smoothly progressive his blood pressure and breathing curves. Those deceivers who appear calmest, most indifferent and to hold the situation best in hand are the ones most readily betrayed.[65] Not by fear, but by dominance.

Though it is dominance that betrays the deceiver in all deception techniques, fear is probably present in the consciousness of all deceptive witnesses. As has been pointed out, however, the negative type witness is able to overcome it. That is, erase it from his consciousness so that it will not affect his overt vocal responses. Fear is the product of a conflict between dominance and compulsory over-compliance and wherever it exists in the responses of a deceptive witness, it is found to express itself in symptoms of conflict such as lengthened reaction-times and more erratic blood pressure and breathing curves. These are the symptoms of the positive or weak type of deceptive witness. In no wise does it mean, however, that the weaker type of deceiver does not respond dominantly to crucial words or questions. Thus, while all deceivers are betrayed by dominance only the weak or positive type are by fear.

It is apparent from the foregoing that there are two types of deception tests:

(1) Dominance Tests, such as the systolic blood pressure, breathing, and negative-type reaction-time,[66] which reveal the presence of deception by detecting each increase of the receiver's effort to withold the truth;

(2) Fear Tests, such as the lengthening of reaction-times and guilty word-associations, which reveal the deceiver's deception only at such times when he yields to the torture produced by conflict and relaxes his grip on the concealed facts.[67]

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[65] Supra, note 4. In a letter by George K. Home, Chief of Detectives, Los Angeles, Cal., commenting on the solution of two bank robberies in which the suspects were "blase, indifferent, and to all outward appearances calm, cool, and self-contained"; the Chief "found the reaction as recorded by this machine, to be infallible. . . ."

[66] A negative reaction-time is unlike the other dominance tests in that the quantitative data obtained show a decrease whereas the others show an increase. To state it differently, dominance in the reaction-time test is illustrated by a shortening of reaction-times.

[67] Supra, note 34, at p. 371 ff.

The data furnished by the deception tests hardly present the difficulty of interpretation under the foregoing theory that was evident when fear was assumed to be the basic emotion involved. The quantitative results which presented an unresolvable inconsistency when an explanation was attempted in terms of fear now offer no theoretical problem to the investigator. Its virtues in the theoretical simplification of interpretation should not, however, blind the eye to its obvious limitations. As has already been pointed out, results which may be mistaken for a consciousness of deception may in reality represent the unearthing of an emotional complex, while a total absence of data pointing to a consciousness of deception may in fact be the result of psychosis. There is as yet no magic formula which can be indiscriminately applied to each set of facts to effect the desired results. The human factor still occupies an important place in the deception equation. So long as this condition exists the application of scientific techniques for the detection of deception must remain the peculiar province of the trained psychologist.

Conclusion

It is generally agreed that an elaborate superstructure cannot be built on theoretical foundations which cannot withstand the exacting light of scientific scrutiny. Notwithstanding, there have been many instances in which fallacious theories have found useful application and were therefore pragmatically justified. Such is not the case, as the writer has attempted to show, with the theory which postulates fear as the basic emotion involved in deception. It merely adds another difficulty to those normally encountered in interpreting the quantitative data. If the investigation of deception techniques has any justification it is as an instrument of applied psychology, and no court will be justified in admitting evidence furnished by these tests unless it is convinced that a sufficiently sound and fundamentally scientific knowledge of the processes involved are known. Unless the expert can justify his opinions by showing on what psychophysiological facts they are founded, they will be unworthy of serious consideration. It is problematic whether the theory outlined can withstand the ravages of future scientific analysis. It is believed, however, that it has cleared the air for more intelligent thinking and has furnished a justifiable working hypothesis. The eyes of the legal profession are trained on the psychologist. For it can do little until scientific research has given it a basis on which to work.

THE LIMITATIONS OF PSYCHOMETRICS IN CLINICAL PRACTICE[1]

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PSYCHOMETRY may be defined as the technique of measuring traits or capacities or of the devising of methods for such measurements. Clinical psychology is a much broader field, it aims at understanding not only the separate capacities and limitations of the individual but also the causes for the status of each of these; and their inter-organization into the psychological entity that we know as the individual. It is also within the scope of clinical psychology to study adjustment difficulties, methods of readjustment and to assist in the application of these methods.

The data secured by psychometric technique are of immense importance to the clinical psychologist as representing measures of traits, but there their contribution ends. The data of psychometrics have exactly the same place in relation to clinical psychology as have the laboratory findings of the bacteriologist or the urologist to clinical medicine. Psychometry is to the clinical psychologist what optometry is to the ophthalmologist; just as many ophthalmologists prefer to make their own measurements which they think they can make more carefully and understandingly because of their broader training, so some clinical psychologists prefer to make their own mental measurements.

A recent text by one of the most successful of the clinical psychologists in this country makes the following statement regarding the use of the "Stanford Scale": "There is no reason why an expert examiner should make for the separate test items any notes except passing or failing. Indeed, such pausing to write is contra-indicated both as a waste of time and a distraction or embarrassment of the subject." This position well illustrates the psychometric attitude toward test procedure and test data. It also clearly indicates the chief limitation of psychometrics in clinical psychology—namely, that psychometrics present only quantitative and not qualitative data.

It is our position that qualitative data, such as may be secured

[1] An abstract of this paper appears in the Proceedings and Papers of the Ninth International Congress of Psychology.

by noting in detail not only the responses of the patient t· ·h test situation, but also any other behavior accompanying the s- entation of such test material is of equal, if not greater, importa ·e than the mere quantitative findings resulting from the use of the tests. To support this position the following case material is briefly presented:

First let us consider the case of a boy, nine and one-half, who was brought for examination because he was still in the first grade and not passing his work and also because he was frequently quarrelling and fighting on the school grounds. The psychometric results available from the Stanford Revision are the following: Basal age, 4; M.A., 7; I.Q., 74; range, 5. If the range is regarded as significant there is a suggestion of psychopathy, but not an understanding of its basis. If the range is not considered significant the conclusion must be, on the basis of the psychometric data alone, a subnormality in general intelligence. The picture is incomplete and bare.

But for this same case when we refer to the detailed record of responses, we get very illuminating data. The suggestion of psychopathy resulting from the distribution of successes over the different year levels is supported by marked irregularity in the quality of individual responses. Thus, even though failing in one of the tests at the 5-year level, voluntary additional remarks given after the color naming test show a level of interest and knowledge above this test level and the level of the boy's mental age and his place in school. The boy said, "Led (red) and blue make green; up to school led and blue bump into each other and make primary color. Green and blue make yellow—primary color."

The response to the comprehension question, "What is the thing for you to do if a playmate hits you without meaning to do it?", was, "Beat 'em—that is the way I do. I'm mean to fight, all right. I'm like my daddy, people leave me alone, I leave them alone. People who don't leave me alone are going to get hurt." Here we get a picture of the boy's general attitude as well as a suggestion of at least one of the sources of that attitude and of the extreme irritability which is at the basis of his frequent conflicts on the school grounds. The answer also indicates an egocentric tendency.

In the giving of the meaning of "curse" in the vocabulary test as "sin of soul—so bad man gets you. I get mad sometimes, so I say something. Lot of cussing on our street"—we get a lot of informative data. The egocentric tendency is again mani-

f[illegible]d. The pernicious use that has been made of fear to control t[illegible]hild's character is clearly shown and at least gives a suggestion of the probable character of his parents. The type of neighborhood in which he lives is also suggested.

Very clear evidence of a tendency towards perseveration is shown by comparing the responses to two of the sub-tests of the series. When asked how wood and coal were alike the boy said, "burn". Considerably later during the examination when asked to give the difference between wood and glass, the response was, "Glass you put in window like that and *coal* to burn." The noting of this perseverative tendency is of vital importance in helping to understand a lack of capacity for easy adjustment to changing situations.

In the case of an eighteen-year-old boy who was examined because of his passing worthless checks and later leaving home with $500 which he had collected from his father's customers, we feel that as much significant information was given by a single response to one of the fabies as by all the strictly psychometric data resulting from the entire Stanford Examination. The summary psychometric data were: Basal age, 10; M.A., 13–1; I.Q., 82; range through the 14-year level.

In response to the question as to what lesson was taught by the Fox and Crow fable the boy said, "That if you want to get something from some one that is easily flattered, you can flatter them and get whatever they have." Here you have epitomized an important aspect of this boy's whole behavior organization. All the pluses and minuses of the entire test could not have given this. It is not only in connection with the tests of general intelligence that we get valuable information from the qualitative data. I believe that going over the carefully recorded examination data from any of the standardized psychometric tests will give evidence of the same kind. The following case illustrates this point.

A young man of twenty-three had been passing worthless checks for a number of years. He also made many purchases without ability to pay. All resulting difficulties had been met by members of his family. He was living at home, making what small amount of spending money he had by gambling. The whole case history showed that he always had taken the easiest course and that he had never fully faced situations. One response on the Downey will-temperament test gave a perfect presentation of this type of behavior. In the test of this series for coördination of motor impulses, the subject is instructed to write the phrase, United

States of America, as rapidly as possible and at the same time to get it all on a given short line. This subject wrote rapidly, but when he had the first three words written, he was at the end of the line. After the briefest hesitation he startd back at the middle of the line and wrote the last word over what he had already written. The satisfied smile with which he looked up at the examiner showed that he had no appreciation that he had evaded the difficulty with which he had been confronted. This test behavior also made it possible to show in a concrete and convincing manner to the patient himself the characteristic inadequacy and impracticability of all of his behavior.

COLOR PREFERENCE IN THE INSANE*

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PROBLEM

THE object of this study was to ascertain some of the factors which influence the preference for certain colors among persons affected with mental diseases. The writer has endeavored to determine: (1) whether certain colors are generally pleasing to the insane, (2) whether noticeable similarities exist between color preference in the insane and in children, (3) whether color preference in the insane varies with age, (4) to what degree and in what way such preference varies with length of residence in the hospital, (5) the relation, if any, of color preference to diagnosis of mental diseases, (6) whether any relation exists between color preference and sex.

REVIEW OF PREVIOUS WORK

Several years ago (1922) a study[1] was made by the writer of The Color Preferences of Children. Approximately 2,500 school children, ranging from kindergarten to college students and from five to twenty-two years of age, were examined. The results were arranged according to school grade, chronological age, by contrasting the choices of pre-adolescent and post-adolescent pupils, by choices for longer and shorter wave length, and by a consideration of other factors. The tests were made with Bradley colored papers of six spectral colors: saturated red, orange, yellow, green, blue and violet. Each color was numbered so that there could be no possibility of confusion due to the wrong naming by the children. The following results were obtained:

1. Blue was the most frequently preferred color at every age and in all grades from kindergarten to college, 47 per cent of the pupils choosing this color. Green was a distant second, red a close third, violet and yellow followed, with orange the least pleasing of the six.

2. There was a distinct rise in the preference values of green, blue and violet, the colors of short wave length, and a corresponding decline in the

* The data for this paper were gathered at the Hudson River State Hospital, Dr. C. O. Cheney, Superintendent.

[1] The Color Preference of Children, S. E. Katz and F. S. Breed. Journal of Applied Psychology, Sept., 1922, Vol. VI, pp. 225–266.

values of red, orange and yellow, the colors of long wave length, as the children advanced in age and grade.

3. In comparing pre-adolescent with post-adolescent pupils, there was marked loss in the popularity of yellow and orange and increase in that of green as the children matured.

4. Red was more favored and green less favored in children of poor than in those of well-to-do neighborhoods, in the earlier years, but this difference tended to be overcome as the children advanced in grade and age.

5. No striking difference in color preference was observed in the sexes.

The results of this investigation have been used in the present study, in comparing the color preferences of the insane with those of normal children of different ages. As the appreciation of color in an individual may be regarded as a simple and spontaneous expression of the person's esthetic sense and existing mood, we tried to ascertain whether color preferences of patients with mental diseases more nearly approximated those of early childhood or adult life, by comparing them with the preferences of pupils of school and college ages.

METHOD

This investigation was carried out at a State Hospital. Four hundred and thirty-three patients were examined. These were fairly representative as to age, length of residence, diagnosis, education and social status, of patients in similar institutions. The method employed was as follows: Six spectral colors were used: red, orange, yellow, green, blue and violet. These colors, rectangular in shape, one and one-half inches square, cut from Bradley colored papers were pasted in two rows on a gray cardboard. They were three inches apart. The colors were numbered haphazardly and the number of each color placed above it. The cardboard was presented to the patient and he was asked to place his finger on the number of the color he liked best. After he had made the choice he was asked in a similar manner for the next best color, and so on. Some of the patients coöperated well and made six choices. Others quickly lost interest and made only one, two or three. As soon as there was the slightest indication that the patient was bored by the procedure, the test was terminated.

RESULTS

The results are presented in two tabulated forms: (1) by giving the actual number of preferences for each color, (2) in order to make the study comparable in the various groups, the per-

centage of choice given for a color in each group was calculated to the first decimal place and then multiplied by ten to determine the number of preferences per thousand subjects. From these comparable values, the order of preferences for the color was determined for the various groups discussed.

Color Preferences for Total Number of Patients.—Tables I and II show the preferences in order of choice for the total number of male and female patients: Tables III and IV, the number of votes per thousand subjects cast for each color by the total number; and Tables V and VI, the order of preferences.

TABLE I

TOTAL NUMBER OF PREFERENCES FOR MALE PATIENTS

	R	O	Y	G	B	V	Total
1st	25	21	19	43	90	22	220
2nd	21	18	19	35	45	32	170
3rd	36	22	22	24	14	41	159
4th	28	22	26	33	13	24	146
5th	21	36	33	23	6	20	139
6th	28	33	36	7	6	23	133

TABLE II

TOTAL NUMBER OF PREFERENCES FOR FEMALE PATIENTS

	R	O	Y	G	B	V	Total
1st	29	24	25	21	86	28	213
2nd	32	11	11	24	26	27	131
3rd	20	15	16	22	14	16	103
4th	15	16	11	18	9	10	79
5th	9	19	14	15	3	11	71
6th	9	14	18	8	5	15	69

TABLE III

NUMBER OF VOTES PER THOUSAND SUBJECTS CAST FOR EACH COLOR BY ALL MALE PATIENTS

	R	O	Y	G	B	V
1st	114	95	86	195	409	100
2nd	124	106	111	201	265	188
3rd	226	132	132	153	88	258
4th	192	151	178	226	89	164
5th	151	259	237	165	43	144
6th	210	248	271	52	45	173

TABLE IV

NUMBER OF VOTES PER THOUSAND SUBJECTS CAST FOR EACH COLOR BY ALL FEMALE PATIENTS

	R	O	Y	G	B	V
1st	136	112	117	99	404	131
2nd	272	84	84	183	198	206
3rd	194	146	155	214	136	155
4th	190	203	139	228	114	127
5th	123	268	197	211	42	155
6th	130	203	261	116	72	217

TABLE V

ORDER OF COLOR PREFERENCES FOR ALL MALE PATIENTS

	R	O	Y	G	B	V
1st	3	5	5	2	1	5
2nd	4	5.5	5.5	2	1	3
3rd	2	4.5	4.5	3	6	1
4th	2	5	3	1	6	4
5th	4.5	1	2	3	6	4.5
6th	3	2	1	5	6	4

TABLE VI

ORDER OF COLOR PREFERENCES FOR ALL FEMALE PATIENTS

	R	O	Y	G	B	V
1st	2.5	4.5	4.5	6	1	2.5
2nd	1	5	5	4	2.5	2.5
3rd	2	4.5	4.5	1	4.5	4.5
4th	3	2	4	1	6	5
5th	5	1	3	2	6	4
6th	4.5	2	1	4.5	6	2

Blue was the most pleasing color to the total number of patients of all ages and both sexes, 40.9 per cent of males and 40.4 per cent of females giving first preference to this color. This percentage is lower than for the total number of school and college pupils: namely, 47. Green was a distant second and red a close third with the patients, as with the school children. Unlike the pupils, the patients showed some difference in liking for this color by sex, green being second with males and red with females. No appreciable difference was found between the patient and pupils with regard to the three remaining colors, violet standing fourth, with yellow and orange last in both cases.

Color Preferences According to Age.—To determine the influence of age upon the preferences of the insane, the patients were divided into three groups. The first included those twenty-five years of age and younger; the second, over twenty-five and under forty-six; and the third, forty-six and over.

Among males the preference for blue was more pronounced than in either of the larger groups just compared: 60 per cent of males twenty-five and under giving first choice to blue against 40.9 per cent of the total number of male and 40.4 per cent of the total number of female patients, and 47 per cent of school pupils. As age advanced, the percentage of choice for blue decreased, the color being first choice for 45 per cent of males and 39 per cent of females over twenty-five and under forty-six; and of 37 per cent of males and females, each, forty-six and older.

Next to blue, green was the favored color of males of all ages, but with females it tied with red and violet.

Color Preferences According to Length of Residence in the Hospital.—The patients were again divided into three groups. The first included those who had been in the hospital less than one year; the second, those of one to three years' residence; and the third, those remaining after three years. This division is of significance, as individuals in the hospital after the third year are, for the most part, those showing marked deterioration. They would be expected to approximate in preference more nearly the younger children than the older, as psychoses are generally regarded as a regression to a more infantile level.

These groups showed greater variability among females than males. The latter keep consistently to blue first and green second; with females blue is followed by red, violet and green, each scoring sometimes high and sometimes low.

The group in the hospital less than one year included only females. Of these, twenty-one, or 55 per cent, gave first preference to blue, and six, 16 per cent, to red. This percentage of votes for blue as first choice was larger than for any other hospital group, except that including all males under twenty-five (60). It was also larger than for the total number of school and college pupils (47).

Blue was first choice for 41 per cent of male and 33 per cent of female patients; green for 31 per cent of males; and red and yellow, each, for 20 per cent of females.

Among patients in the hospital three years or longer, blue led with a percentage of 41 for males and 38 for females. The votes for green fell to 16 per cent as first choice for males, and 11 per cent for females; while the preference for red, orange and violet was considerably higher than in the preceding age group, for males, and that for green and violet for females. Taking both sexes together by adding the percentages of male and female votes and dividing by two, the percentages were: Blue, 39; green, 14; violet, 13; red, 13; orange, 11; and yellow, 9.

The patients who had been in the hospital three years or longer, presumably those with most marked mental deterioration, showed less decided liking for blue than the total number of school children, as well as less than the total number of patients. Their liking for this color more nearly approximated that of the children of the kindergarten and first grades than pupils in the higher grades.

Comparing this group with patients in the hospital from one to three years, the preference for green and yellow was found to be more pronounced for those of shorter residence (green, 19 per cent; yellow 16 per cent, against green, 14 per cent, yellow,

9 per cent); while that for orange was greater for those of longer residence (11 against 10 per cent).

TABLE VII

NUMBER OF VOTES PER THOUSAND SUBJECTS CAST FOR EACH COLOR BY PATIENTS WHO HAD BEEN IN THE HOSPITAL THREE OR MORE YEARS AND BY PRE- AND POST-ADOLESCENT PUPILS

	R	O	Y	G	B	V
Patients	130	110	90	140	390	130
Pre-adolescents	140	80	110	130	450	120
Post-adolescents	150	40	50	210	450	120

Color Preferences According to Diagnosis.—Among male dementia praecox, the preference for blue was more marked than in either of the other two groups by diagnosis: namely, manic-depressives and patients with other diseases. The reverse was true of females. Taking both sexes, 38 per cent of dementia praecox and manic-depressives, each, gave first preference to blue, and 42 per cent of all other patients. Green received the first choice from 16 per cent of dementia praecox, 9 per cent of manic-depressives, and 13 per cent of other diseases. No female manic-depressives gave first choice to green, and only a small proportion of the group of other diseases. From these votes it would seem that sex was a more important factor in the liking for green than diagnosis. As second choice, the votes for green were: Manic-depressives, 35 per cent; dementia praecox, 19 per cent; other diseases, 15 per cent.

For red as first choice, the percentage of votes were: Manic-depressives, 16; other diseases, 15; dementia praecox, 12. As second choice, they were: Manic-depressives, 22; dementia praecox, 18; other diseases, 13. Red would therefore appear to be more popular with manic-depressives than with either of the other groups. The preference for this color was equally divided between the sexes among manic-depressives, but in the two other groups it was more marked among females than males.

Orange and yellow were also best liked by manic-depressives; green by dementia praecox; and violet by all others.

Variation in Preference According to Wave Length.—Blue, green and violet, colors of shorter wave length, stood higher in favor with patients of shorter residence than with those of longer; and red, orange and yellow, colors of longer wave length, higher with those of longer residence. In inverse order, this corresponds with the preferences of school children, which showed a continuous rise in the values of green, blue and violet and a depreciation in

those of red, yellow and orange as the pupils advanced in age and grade

Some Practical Applications of Results.—The results obtained by this investigation suggested their practical application in dealing with insane patients. The special preferences of the various groups studied might be more specifically observed and the knowledge gained applied in occupational therapy. Patients whose color preferences approximated those of young children might be more interested in learning hand crafts when the work involved the use of materials of the bright colors than when colors of short wave length were used. Also in the furnishings of living quarters the selection of colors pleasing to special groups of patients might be worth consideration.

SUMMARY

1. In every group of hospital patients examined blue was found to be the most pleasing color. Green was a distant second and red a close third, with violet, yellow and orange fourth, fifth and sixth.

2. The popularity of colors of shorter wave length was more pronounced for patients of shorter residence, and of colors of longer wave length for those of longer residence.

3. The most noticeable difference in groups of patients was for green, yellow and orange. Green was more favored by those of shorter residence; orange and yellow least liked by this group and best liked by the group in the hospital three years or more.

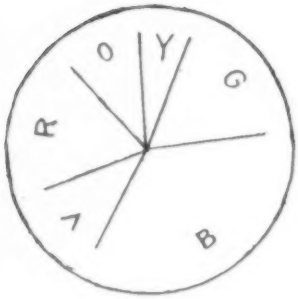
4. More marked variation was noted when patients were grouped by length of residence than by diagnosis. This is partly explained by the fact that early diagnosis of mental diseases is less significant than the degree of deterioration after the third year.

5. Greater variability was shown by females than males. Green was better liked by males, and red by females.

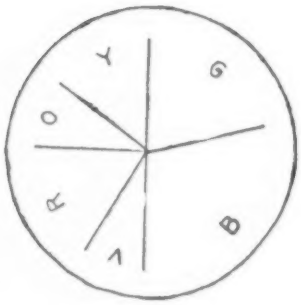
6. Red, orange and yellow were more pleasing to manic-depressives than to either of the other groups by diagnosis.

7. Knowledge of color preferences of patients with mental diseases, according to age, sex, diagnosis and degree of mental deterioration, might be practically applied in vocational therapy and also in the selection of colors for the furnishings of living quarters.

Males



Hospital



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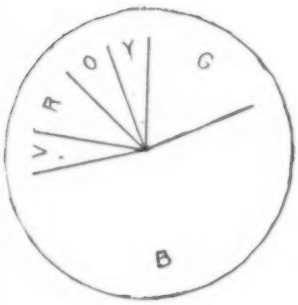

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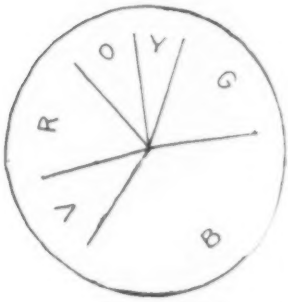
Females



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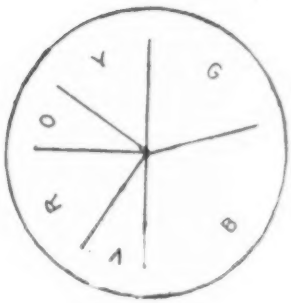

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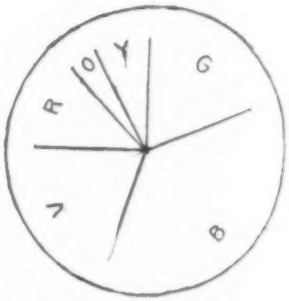

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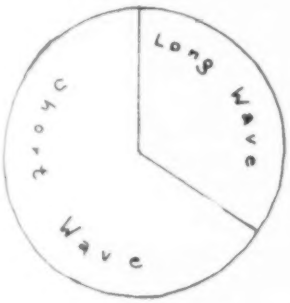
Shown by Wave Length

Males



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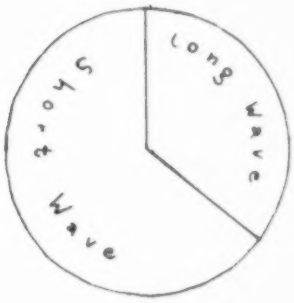
Females



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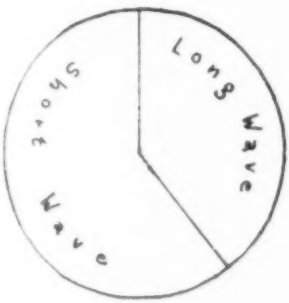
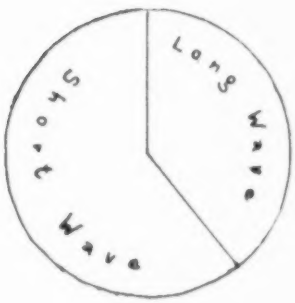
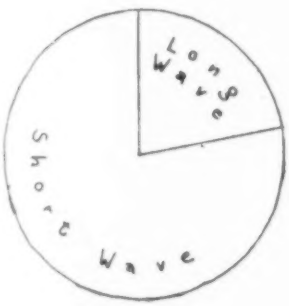


1st Grade



1st Grade



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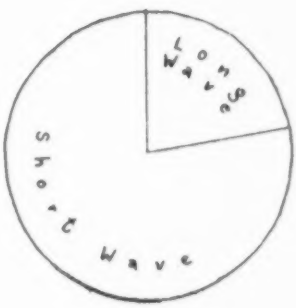

College

THE RELATION OF THE KNEE JERK AND STANDING STEADINESS TO NERVOUS INSTABILITY *

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THE question of the relationship of the knee jerk and standing steadiness or Romberg sign to "nervous instability" involves two distinct investigations; first as to the existence of demonstrable individual differences in these reflexes, and second as to the correlation of the reflexes with each other and with "nervousness" or "emotional instability" as indicated by such available criteria as ratings and questionnaire score.

The statement is often made in current neurological texts that the neurotic individual has exaggerated reflexes. A hyperactive knee jerk is given in clinical manuals as part of the diagnostic picture of neurasthenia. Another symptom said to be often found is a positive Romberg sign. Both of these tests, though relatively crude, are capable of yielding numerical scores which can be treated statistically. This, for the purpose of our study, gives them a marked advantage over the pharyngeal reflex which again is supposed to have distinct clinical significance. In contrast to the tendon reflexes, this is described as absent or depressed in "functional diseases of the nervous system". A few observations were made by us with this reflex and also with a salivary reflex.

By "nervous instability" we mean only, on the one hand, that which the Woodworth or Matthews questionnaire measures, and on the other, that which the layman means by the term. If there is no relation between these two meanings, no correlation should obtain between the scores, and if there is no agreement between laymen in the use of the term, this too should be obvious from the distribution of ratings. Although we cannot show from our data that the physician means by neurotic what the layman calls "nervousness" or the psychologist "emotional instability", it is surely the "nervous" child for whom advice is sought and the maladjusted adult who himself seeks advice. The clinician's diagnosis of neurasthenia is largely based on negative data: the absence of organic lesions; his positive data, if we exclude the

* This investigation was made at the University of Chicago under the direction of L. L. Thurstone. It also appears as a study from The Institute for Juvenile Research and it is listed with the Institute as Series B, No. 154.

debatable ground of reflexes which we are here attempting to study, is derived from such questions as the questionnaires incorporate, and from a rating based on a personal interview.

Much clarification of concepts in this field remains to be done. This investigation was undertaken merely with the hope of contributing a few general contour lines to a relatively uncharted area.

Outline of Procedure

Apparatus and Experimental Technique.

The method used by us in obtaining and recording the knee jerk, standing steadiness and a salivary reflex has been described in full in our article on the effect of fasting.[1] The knee jerk was induced by an electrically driven hammer which was adjusted to deliver a blow of such force as would cause the least perceptible movement in a beam balance against one end of which it was placed at rest, counter-balanced by 430 gms. The patella tendon was struck perpendicularly at a spot one-third of the distance from its upper attachment. The subjects lay with eyes closed on a padded table and the blows were given in an irregular series of intervals varying from four to twenty-five seconds, to avoid the effect of expectancy and rhythm. The excursion of that part of the leg which was exactly seven inches below the table top was measured by means of a continuous tape on a modified myograph apparatus. The free pendulum-like swinging of the leg from the knee when raised by the experimenter or following a knee jerk was taken to be evidence of local relaxation and was present in all subjects when the experiment took place. At each test twenty knee jerks were recorded and the average of the four sums of five successive kicks each was taken as the subject's score.

Standing steadiness or the Romberg test was recorded graphically by means of a marker attached vertically to the subject's head. The latter stood in military position with heels together, toes slightly apart and eyes shut and was merely told to stand as still as possible for one minute. Two one-minute records were taken of the children and three of the adults. The sums of the greatest and least diameters of these tracings (which were not necessarily at right angles to each other nor parallel to the body planes) were determined, and their average taken as the day's score. A useful and time-saving modification of the method of recording devised by us was as follows. In place of a metal stylus attached to the head and writing on a smoked paper, there

[1] Lee, M. A. M., "The Effect of Fasting on the Knee Jerk and Standing Steadiness," American J. Physiol., 1929, 90, 184–193.

was attached to the head band a loop of insulated wire of which only the terminal acute bend was exposed. By suitable heating of this wire electrically, it would trace a white line on a wax paper without burning the paper. The wax paper was easily fastened by thumb tacks to the horizontal board of adjustable height above the subject and could be quickly removed and filed as a permanent and non-bulky record.

The salivary reflex used depended upon the slight tendency to nausea or gagging caused by the presence in the mouth and across the posterior part of the tongue of a circle of twenty-four porcelain beads, three-fourths of an inch in diameter, strung on a flexible wire. The response recorded was the total salivary secretion during the first ten minutes that the beads were in the mouth. This was collected by means of a dentist's glass salivary ejector and controlled suction, and was measured in ccs.

In testing the pharyngeal reflex, the usual medical procedure was followed. The child being told to open his mouth widely, the posterior part of the tongue was gently held down by means of a tongue depressor, and the posterior wall of the pharynx was briefly touched by a long cotton-wrapped wooden applicator without touching the fauces. A physician's examination of throats becomes through practice highly automatized and probably changes little from subject to subject. However, techniques vary as well as subjective scales and for this reason and also to obviate errors in measurement due to individual differences in reaction to the personality of the experimenter, Dr. William Fishbein, the school physician, kindly ran the same test on all of the subjects. It was felt that agreement between the findings of the two different experimenters on different days would in this more or less subjective test be more significant than agreement between repeated tests by the same individual. The positive and negative scores include only those cases in which the reflex was definitely present or absent on both occasions; the intermediate group includes not only those in which the findings are in disagreement but those in which the reflex was found to be slight or doubtful.

Subjects and Plan of Experiments.

During the year of 1922 and 1923, a preliminary study was undertaken to determine the range of variability of the knee jerk and steadiness under standardized laboratory conditions. There were two subjects, a man and a woman, both research students in physiology. The tests were given daily at the same hour each day and no variables were introduced except certain periods of

experimental insomnia and fasting, the findings of which have been previously reported.[1]

Experiment 1, conducted in February and March, 1928, is a study of ten medical school students selected as exhibiting different degrees of nervousness according to the ratings of their classmates. The ninety-three members of the second year class in medical school were asked independently to divide the students whom they knew in the class into five groups, from "one" (most nervously excitable or unstable) to "five" (most phlegmatic). Sixty-three students were rated by more than twenty judges. The average rank given each was calculated and the average deviation from that rank. Eleven were selected who had an A.D. of less than .6. One of these refused to serve as subject in the experiment. As there was greater agreement in regard to the students rated nervous than those rated phlegmatic, those with an average rating of four or five had large average deviations and so were not included in this group. The range of ratings was 1.1 to 3.2 in the ten chosen as subjects. The score of these on the Woodworth questionnaire was also obtained. The tests used were the knee jerk, standing steadiness, and a salivary reflex. They were obtained over a period of four weeks at different hours of the day as chance dictated without any attempt being made to avoid such variations in activities or worries as are incidental to ordinary daily life.

Experiment 2 (March to June, 1928) is a more extensive study of 258 children in the third, fourth, fifth, and sixth grades of the elementary school of the University of Chicago. Two tests, a week apart, were given to each child, one in the morning and the other in the afternoon, but with the exact hours subject to variation. The children were independently rated by three to five teachers as to their "nervousness". After the rating and without warning that it would be required, the teacher was asked to indicate in the case of each child judged nervous, upon what her judgment was based. A year later, 151 of these children were given the Matthews revision of the Woodworth questionnaire.

RESULTS AND DISCUSSION

Preliminary Study.

The daily records of the knee jerk of the two subjects during November and December, 1922, show that both subjects varied considerably from day to day, but that these variations tend to be confined within narrow limits. Subject Ha at this time had

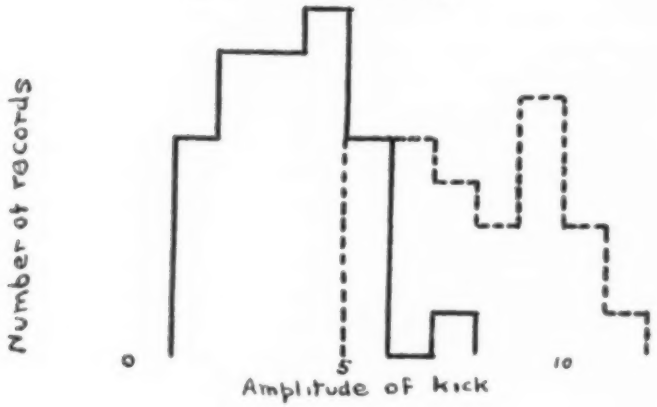
[1] Lee, M. A. M., and Kleitman, N., "II. Studies on the Physiology of Sleep," American J. Physiol., 1923, 67, 141–151.

a consistently higher knee jerk than subject K. This is indicated by the superimposed histograms of both subjects showing the distribution of their records during this period (Figure 1-a). These limits are exceeded only in a period of five days fasting in both Ha and K and the menstrual period in Ha.

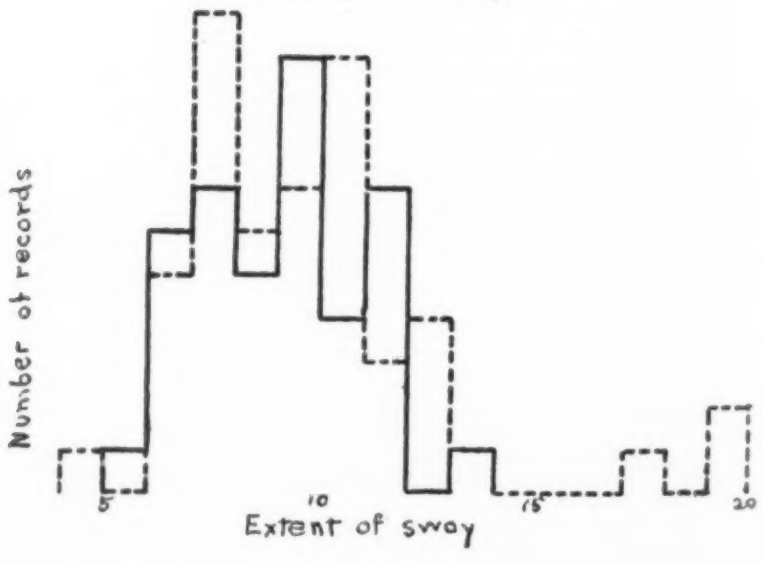
FIGURE 1

DISTRIBUTION OF DAILY RECORDS OF K (——) AND HA (- - -)
With fasting, insomnia and menstrual periods omitted.

a. KNEE JERK RECORDS
(10 determinations each day)



b. ROMBERG TEST
(3 one-minute trials daily)



As it proved impossible to keep our room at a constant temperature level, the curve of variation of temperature in the second half of the test period was compared with the variations in the knee jerk records. In some cases a sudden rise in the temperature produced a decrease in the knee jerk of both subjects, and a fall an increase. In fact these are the only cases in which the variation in the two records are coincident and in the same direction. We may conclude, therefore, that whenever there was an environmental cause of the variations operative, temperature was an index or partial component of it.

There can be no doubt that a true individual difference between K and Ha in the knee jerk existed during the months tested, a difference that far exceeded the variations due to objective or subjective causes, and for these months a measure of the knee jerk expressing its range of variation and central tendency can be said to be characteristic of the individual. That it may not be characteristic of these subjects a few months later we are equally confident, for at the end of December the knee jerk experiment was discontinued until May and it was then found that the knee jerk of K had so greatly decreased as to be barely obtainable without using some method of augmentation. The knee jerk of Ha, on the other hand, was approximately unchanged. The relevance of the fact that K was working under considerable strain at this time in preparation for his doctorate examination is, of course, debatable.

The steadiness records of these two individuals were not obtained the same year and there is no clear difference between the histograms of the two individuals (Figure 1-b). We can only say that over the periods tested, the two individuals produced rather closely similar pictures. As in the knee jerk, however, the relatively restricted range of variation, except during periods of experimental insomnia, seems a rather clearly established finding.

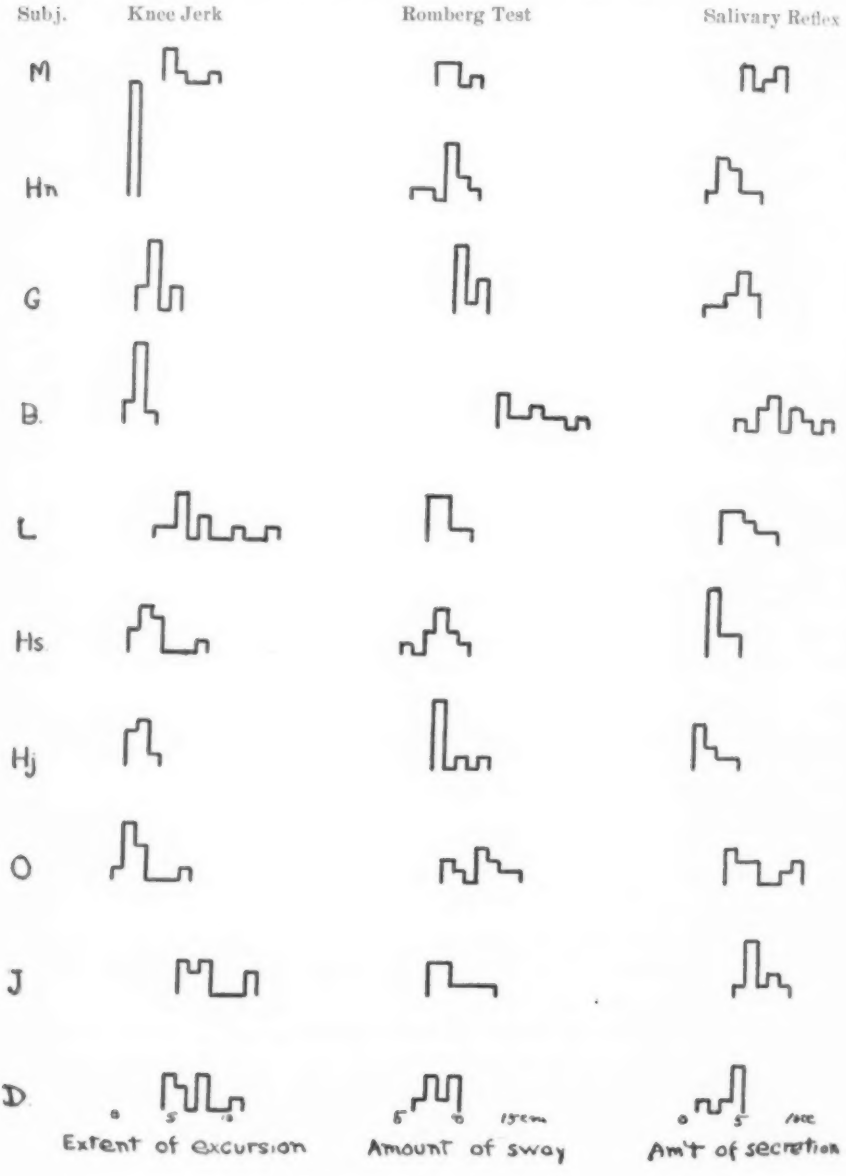
Experiment 1.

The ten measurements of the ten subjects in the three tests show, as in the preliminary study, a tendency for the individual to present a typical picture which differentiates him from other subjects in spite of the fact that the tests were conducted at different times of the day and under various conditions of fatigue or mood such as may occur in the ordinary course of existence. These very sources of variation which are usually eliminated as far as possible are here intentionally admitted and in spite of them there is a rather striking consistency in the records of an

individual. The distribution of the ten records in histograms for each test, shown in Figure 2, illustrates this point.

FIGURE 2

DISTRIBUTION OF RECORDS OF TEN SUBJECTS.



That there is some relationship between the three reflexes also seems to be indicated by the fact that the two individuals, B and O, who deviate the most from the group in unsteadiness in the Romberg test also have very low knee jerks and salivate the most actively in response to an uncomfortable mechanical stimulus in the mouth. This relationship, however, is not consistently present throughout the group as a whole. If we attempt to indicate the relations roughly by the method of rank differences, the possible significance of these extreme cases is concealed. The correlation between unsteadiness and salivation is .54, but between either of these and the knee jerk scores the correlations are only .15 and .17. If we compare, by the same crude statistical method, the scores in the reflexes with the criteria, we again find negligible values for r except in relation to the knee jerk. The amplitude of the latter has a correlation of .50 with nervous stability as determined by ratings and —.69 with neurotic tendencies as indicated by the questionnaire. The significance of these relationships depends, of course, upon the validity of our criteria. The latter seems to be indicated by the high correlation (—.83) between the ratings and the scores on the Woodworth questionnaire. This may be due in part to the high reliability of the ratings of the subjects chosen, and also to the probability that medical school students have opportunity to observe each other in conditions which involve more than usual stress—early days of dissecting and operating, laboratory emergencies as well as quizzes—and so have much upon which to base their judgments of nervous stability. Yet the validity of even these ratings is not beyond question as perhaps a brief analysis of the ten subjects may suggest.

M and Hn were short, extremely active individuals, walking and talking at a very rapid rate, never still. They both stated that they knew they gave the impression of being nervous but said they did not think they really were. The next two, G and B, on the other hand, felt themselves to be working under great strain. One reported extreme fatigue, frequent headache, and difficulty in digestion and sleeping; the other was maladjusted socially, and was continually engaged in self-analysis. The judgment of nervousness in L and Hs was apparently based on shyness and a tendency to blush easily. The identical rating and similar scores in the questionnaire of the two girls, however, presents a curious anomaly. Hj was socially adaptable, well-adjusted and popular. O, on the contrary, regarded it as a great joke that she had been able to fool the world. She told me "Folks that know me best say that I'm the most nervous person they ever saw." She spoke

TABLE I

AVERAGE SCORES OF TEN MEDICAL SCHOOL STUDENTS BASED ON TEN TESTS EACH

Subject	Rating	Questionnaire score	Amplitude of knee jerk	Extent of body sway in Romberg test	Amount of reflex salivation in 10 min.
M.	1.1 .17	24	3.42"	7.35 cm	5.38 cm
Hn	1.2 .34	21	0	7.26	2.78
G.	2.0 .45	32	1.75	9.36	2.92
B.	2.0 .58	35	0.64	14.90	6.94
L.	2.4 .59	12	4.07	7.46	3.82
Hs.	2.8 .51	13	2.17	7.41	2.15
Hj.	2.9 .48	12	1.23	8.44	1.41
O.	2.9 .57	17	1.22	11.27	5.71
J.	3.1 .50	11	7.52	8.78	6.12
D.	3.2 .47	2	6.61	8.14	3.90

INTERCORRELATIONS BY THE METHOD OF RANK DIFFERENCES

Rating of nervousness and questionnaire score*	r	—.83	.069
Rating of nervousness and amplitude of knee jerk...	r	.50	.168
Rating of nervousness and unsteadiness	r	.36	.194
Rating of nervousness and salivary reflex	r	.07	.222
Questionnaire score and amplitude of knee jerk.....	r	—.69	.117
Questionnaire score and unsteadiness	r	.20	.214
Questionnaire score and salivary reflex	r	.18	.216
Amplitude of knee jerk and unsteadiness	r	.15	.218
Amplitude of knee jerk and salivary reflex	r	.17	.217
Unsteadiness and salivary reflex.....	r	.54	.158

* Nervousness is indicated by a low rating score and a high score in questionnaire.

of "holding on" to herself all of the time, of using all of her power "to keep control and keep calm". When unable to "stand it" any longer, she went home to her mother ("who can always help me") for three days and returned feeling more "relaxed" and "indifferent". On the day of her return, her knee jerk was markedly higher than on other days. One of the other subjects who had worked with her told me she was known as "little poker face" but when operating her hands shook so she had to stop work. We felt that the depressed knee jerk, the marked unsteadiness, the active salivation, as well as a depressed pharyngeal reflex, which placed her at the extreme end of our scale, were more reliable indices of her condition than either the questionnaire or the rating. This was amply proved six weeks later when the girl committed suicide. The two men at the low end of the rating (*i.e.*, having the largest rating score indicating stability) and questionnaire scores, one could hardly doubt were free from neurotic traits. D was a typical "extrovert". J was an intelligent, sensitive person who later had no difficulty in carrying on research which entailed the swallowing of a particularly large stomach balloon. This analysis is presented to show that while in the main our criteria are valid, they are both subject to serious error, and in this group of individuals, at least, they failed to differentiate as

the reflex measures did, the one who was unequal to the test of existence.

Experiment 2.

Two knee jerk records, based on twenty knee jerks each, were obtained a week apart from 254 children in the 3rd, 4th, 5th and 6th grades, and steadiness records based on two one-minute trials each were taken on 188 children in the 3rd, 4th, and 5th grades. Four children were examined on only one occasion in regard to the knee jerk and 70 were tested only once in steadiness. There is a correlation of .757 between the first and second knee jerk records and the two steadiness records correlate .702 with each other. (See Table II). This is in itself evidence that true individual differences exist, since if the spread of the records was a function only of the variability of the reflexes themselves, the correlation should be zero between the first and second series. Correcting these coefficients by Brown's formula, the reliability of the knee jerk test as given is .862 and the steadiness test has a reliability of .825.

A second proof of the existence of the individual differences consists in showing that the standard deviation of the true measurements in the reflexes is larger than the standard deviation of the chance errors. We are greatly indebted to Dr. L. L. Thurstone for the derivation of this proof which is as follows:

Let x be the true measure, and x_1 and x_2 the 1st and 2nd actual scores obtained.

Let σ be the standard deviation of the true measure, and σ_1 and σ_2 be the standard deviations of the obtained scores.

Let e_1 and e_2 be the variable errors in x_1 and x_2.

Let E be the standard error in x_1 and x_2 (assumed to be the same in both cases) or in other words, E is the standard deviation of the variable errors e_1.

$x_1 = x + e_1$

$x_1^2 = x^2 + 2xe_1 + e_1^2$

But since e_1 is a chance error and as often positive as negative $2xe_1 = 0$.

Therefore $x_1^2 = x^2 + e_1^2$

and $\Sigma x_1^2 = \Sigma x^2 + \Sigma e_1^2$

and $$\frac{\Sigma x^2}{n} = \frac{\Sigma x^2}{n} + \frac{\Sigma e_1^2}{n}$$

or $\sigma_1^2 = \sigma^2 + E^2$

In order to isolate σ and E, we proceed as follows:

$x_1 = x + e_1$

$x_2 = x + e_2$

Subtracting we have

$x_1 - x_2 = d = e_1 - e_2$ or $d^2 = e_1^2 - 2e_1 e_2 + e_2^2$

but since $2e_1 e_2 = 0$, $d^2 = e_1^2 + e_2^2$

and $\sqrt{\frac{\Sigma d^2}{n}} = \sqrt{\frac{\Sigma e_1^2}{n} + \frac{\Sigma e_2^2}{n}} = \sqrt{E_1^2 + E_2^2}$

Let $\sigma_d = \sqrt{\frac{\Sigma d^2}{n}}$ the standard deviation of the differences between the first and second measurements of the same subjects. Then $\sigma_d = E_1^2 + E_2^2$, and if we assume these to be equal $\sigma_d^2 = 2E^2$

or $\sigma_d = E\sqrt{2}$ or $\frac{\sigma_d}{\sqrt{2}} = E$

Since $\sigma_1^2 = \sigma^2 + E^2$, $\sigma^2 = \sigma_1^2 - E^2$

and by analogy $\sigma^2 = \sigma_2^2 - E^2$

Adding these $2\sigma^2 = \sigma_1^2 + \sigma_2^2 - 2E^2$

$$\sigma^2 = \frac{\sigma_1^2 + \sigma_2^2}{2} - E = \frac{\sigma_1^2 + \sigma_2^2}{2} - \frac{\sigma_d^2}{2}$$

$$\sigma = \sqrt{\frac{\sigma_1^2 + \sigma_2^2}{2} - \frac{\sigma_d^2}{2}}$$

In our data the following values are obtained.

Knee jerk	$\sigma_1 = 4.508$	Steadiness	$\sigma_1 = 4.114$
	$\sigma_2 = 5.338$		$\sigma_2 = 4.475$
	$\sigma_d = 2.1485$		$\sigma_d = 2.095$
	$E = 1.519$		$E = 1.482$
	$\sigma = 4.701$		$\sigma = 4.034$

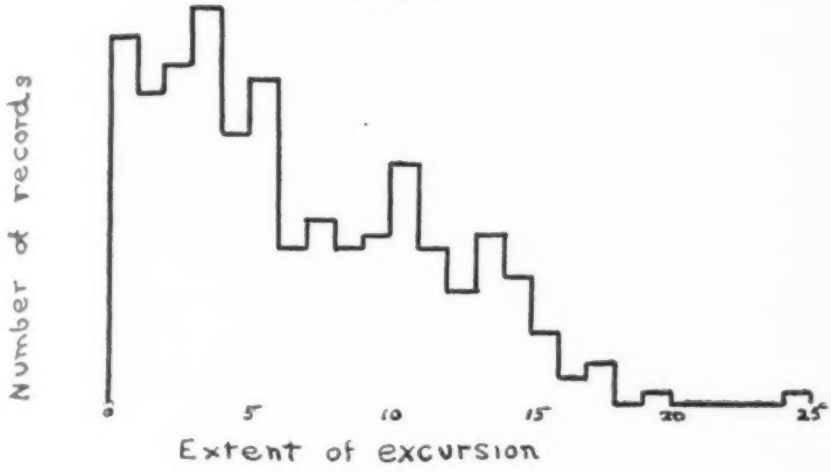
In both cases the sigmas are very much larger than the Es.

If the average of the two tests is taken as the individual's score, the correlation between knee jerk and steadiness is found to be .299, the active knee jerk being associated with a small amount of body sway. If a correlation is made for attenuation this be-

FIGURE 3

HISTOGRAMS OF RECORDS OF 258 CHILDREN.

KNEE JERK



ROMBERG TEST

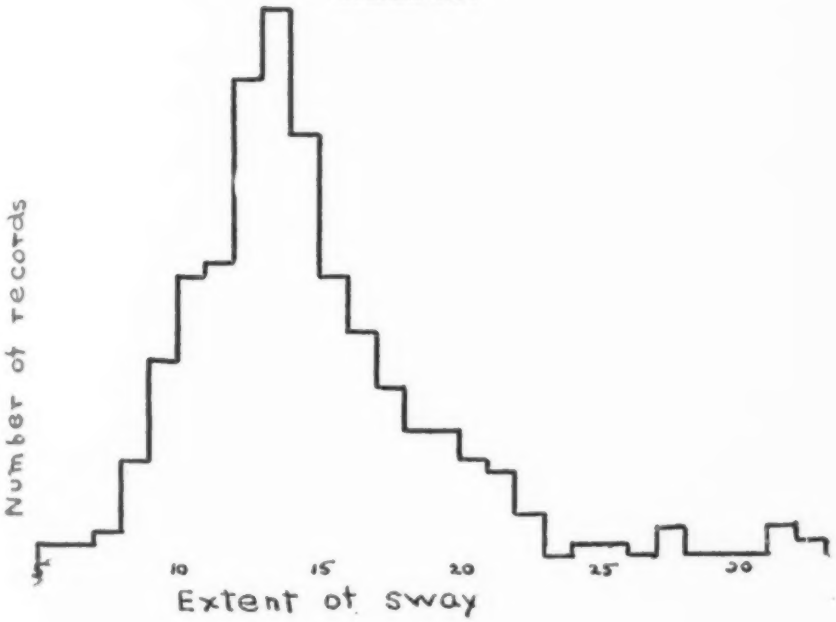
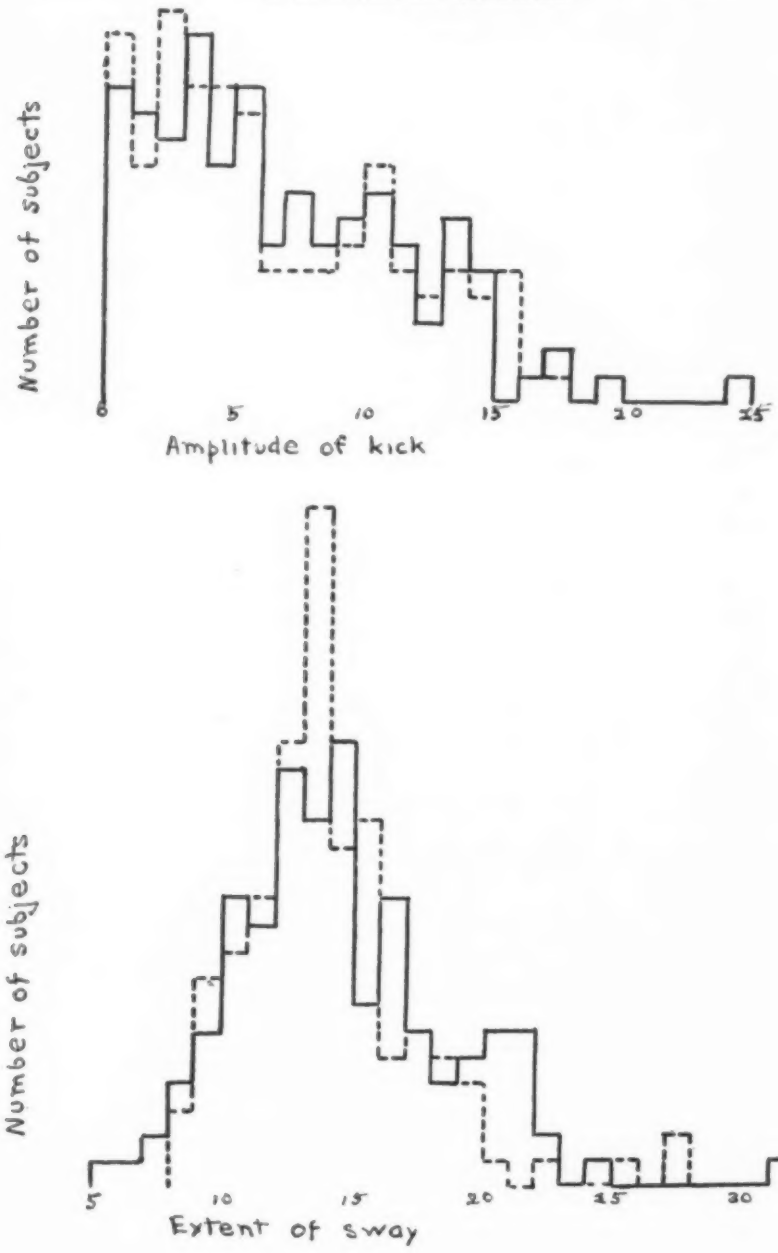


FIGURE 4

SUPERIMPOSED HISTOGRAMS OF RECORDS OF BOYS (——) AND GIRLS (- - -) IN KNEE JERK AND STEADINESS.



comes .354. The correlation ratios, which are .42 and .37 are slightly higher than the Pearson coefficient, suggesting that the relation between the two functions is not linear. This may be due in part to the undistributed zeros in the knee jerk. The distribution of the scores in the two reflexes (Figure 3) shows that both are positively skewed and the knee jerk distribution is cut off at the low end. Apparently there is a distinct tendency for a low knee jerk to be associated with unsteadiness and an active knee jerk with steadiness.

The group was composed of 130 boys and 128 girls. The average knee jerk of the girls was 6.4, of the boys, 6.7. The average score of the boys in steadiness was 14.5, of the girls, 14.1. The superposition of the histograms of scores shows the absence of any considerable sex difference in our sampling of the population of children (Figure 4).

The average scores in the two tests in the four grades were as follows:

	Knee jerk	Steadiness
3rd grade	6.773	15.098
4th grade	5.897	15.006
5th grade	4.729	14.329
6th grade	8.962	13.333

Age in months of 151 of these children in the 3d, 4th and 5th grades was found to correlate negatively with knee jerk scores (—.217), and slightly negatively with scores indicating the amount of body sway in the Romberg test (—.079). The averages above indicate that a larger age range would reveal a greater relationship to steadiness and possibly a reversal in the relation to the knee jerk. It is noteworthy that the older children on the whole stand more steady than the younger in spite of their greater height and weight which of themselves, according to Fearing, are factors correlating inversely with steadiness.

The fact of individual differences being established irrespective of age or school grade and the relation of these differences to average ratings of "nervous instability" is significant only if there is some agreement between the teachers in the use and meaning of the term. The 258 children were placed in three categories, nervous (1), normal (2) and phlegmatic (3) as follows:

16 children were placed by all judges in class 1
73 children were placed by all judges in class 2
6 children were placed by all judges in class 3
76 were placed in both 1 and 2
56 were placed in both 2 and 3
31 were placed in 1, 2, and 3.

Thus we see that there was 37 per cent complete agreement, 51 per cent partial agreement and 12 per cent complete disagreement. This is considerably better than would occur by chance. The ratings of the individual teachers were then compared. There were twelve teachers, none of whom rated less than 30, or more than 70 children. The coefficient of mean square contingency was calculated between each pair of teachers who rated the same children. The values obtained ranged from .191 to .790 and the average was .495. According to Yule .816 is the maximum value obtainable when only three categories are used. If therefore a C of .816 would correspond to an r of unity, C=.495 may be regarded as equivalent to r=.606. As compared with teachers' ratings as generally reported this is a fairly good reliability, and at least indicates that the term "nervous instability" stands for a concept about which there is some social agreement, however unanalyzed it may be or badly named.

If there is an unknown x or group of x's which lend some meaning to the term, we lack at present any direct measure of it. The Matthews questionnaire should à priori be such a measure but she herself was unable to find any close relationship between her scores and any other criteria of emotional instability or neurotic tendencies.[2] This questionnaire was given to 151 of our children. To determine its reliability the first and last quarter of the blank were compared with the middle half. The correlation between these two partial scores was found to be .712. Corrected by Brown's formula, the reliability of the questionnaire would be .831.

TABLE II

CORRELATIONS BETWEEN VARIOUS SCORES OF 258 CHILDREN

First and second knee jerk scores	$r = .757 \pm .02$
Reliability of the knee jerk test	$r = .862$
First and second steadiness scores	$r = .702 \pm .02$
Reliability of the steadiness test	$r = .825$
Average coefficient of Mean Square Contingency between teachers' ratings	$C = .495$
which corresponds to	$r = .606$
Two halves of the Matthews questionnaire	$r = .712 \pm .03$
Reliability of the questionnaire	$r = .831$
Age and knee jerk	$r = -.217 \pm .04$
Age and Romberg test	$r = -.079 \pm .04$
Age and questionnaire score	$r = -.150 \pm .04$

		Age held constant	corrected for atten.
Knee jerk (3) and Romberg test (4)	$r_{34} = -.299 \pm .03$	−.299	−.354
Rating (1) and knee jerk (3)	$r_{13} = .051 \pm .04$		.072
Rating (1) and Romberg test (4)	$r_{14} = -.177 \pm .04$		−.250
Questionnaire (2) and knee jerk (3)	$r_{23} = -.146 \pm .04$	−.117	−.172
Questionnaire (2) and Romberg test (4)	$r_{24} = .216 \pm .03$	.297	.261
Rating (1) and questionnaire (2)	$r_{12} = -.101$ .05		−.142

[2] Matthews, J., "Emotional Instability in Children," J. of Delinquency, 1923, 8, 1–39.

TETRAD DIFFERENCES

$r_{12} \cdot r_{34} - r_{13} \cdot r_{24}$ $(-.101 \times -.299) - (\ .052 \times \ .216) = .018967$
$r_{12} \cdot r_{34} - r_{14} \cdot r_{23}$ $(-.101 \times -.299) - (-.177 \times -.146) = .004357$
$r_{13} \cdot r_{24} - r_{14} \cdot r_{23}$ $(-.052 \times \ .216) - (-.177 \times -.146) = .014610$ P. E. $= .013$

Saturation of the knee jerk with the general factor $= .368$
Saturation of the Romberg test with the general factor $= .722$
Saturation of the ratings with the general factor $= .221$
Saturation of the questionnaire with the general factor $= .359$

If we regard the average rating given to the child as a score (the room teacher's rating being counted twice because of her greater opportunity for observation of the child), we have four independent measures, all of which might be supposed to depend upon the same unknown x. As age correlates negatively to some extent with questionnaire scores, as well as with knee jerk and unsteadiness scores, the age factor may be partialed out. The crude intercorrelations and those corrected for age and attenuation are shown in Table II. In all cases they are low but they are lowest of all between the so-called criteria. The questionnaire correlates somewhat higher than does the rating score with the knee jerk and steadiness. If we set these correlations in a tetrad equation, the tetrad differences are negligible and, if such a procedure be justifiable with such low correlations, we might argue from this that the four measures have a general factor in common, which would of course be the unknown we have called "nervous instability". If this be true and we correlate each of these four variables with the general factor, the two reflexes are shown to be more closely related to it than either the ratings or the questionnaire.

The pharyngeal reflex was absent in a larger percentage of children rated nervous than of those rated phlegmatic, and present in a larger proportion of the phlegmatic children. (Table III.)

TABLE III

THE PHARYNGEAL REFLEX IN RELATION TO RATINGS ON NERVOUS INSTABILITY

Average rating given.....	1	1 & 2	3	2 & 3	3
Number in the group.....	6	73	69	57	6
Pharyngeal reflex present.....	50%	30.1%	34.7%	42.2%	50.0%
doubtful	16.6	22.0	34.9	26.3	50.0
absent	33.4	47.9	30.4	31.5	0

CONCLUSIONS

1. True individual differences exist in the knee jerk and in the Romberg test in the organically sound population.

2. "Nervous instability" is a term in regard to the meaning of which there is considerable social agreement.

3. Ratings by adults of each other agree more closely with the

Woodworth questionnaire score than do teachers' estimates of children with the Matthews questionnaire score.

4. There is no evidence that neurotic tendencies are associated with an active knee jerk. In our sampling of adults and children there is a slight tendency in the opposite direction.

5. The neurotic adult and child tend to be more unsteady than the phlegmatic in the erect position with eyes closed.

6. The neurotic adult tends to have an active salivary reflex.

7. The pharyngeal reflex is slightly more apt to be absent in children rated nervous than in those rated normal or phlegmatic.

8. There is a low negative correlation between degree of unsteadiness and amplitude of knee jerk.

9. There is no sex difference in our sampling of school children in either the amplitude of the knee jerk or in steadiness.

10. Within the age range of the 3d, 4th and 5th grades there is a low inverse correlation between age and amplitude of the knee jerk, degree of unsteadiness, and questionnaire scores.

NEW BOOKS RECEIVED

(This notice does not preclude the book from further notice or review.)

Conflicting Penal Theory in Statutory Law. By Mabel A. Elliott. University of Chicago Press, 1931. Pp. xiii+274. Price $4.00.

Speech and Voice. By G. Oscar Russell, Ph.D. The Macmillan Company, 1931. Pp. xvii+250. Price $4.00.

Field of Psychology. By Glenn Devere Higginson. Henry Holt and Company, 1931. Pp. xviii+613. Price $2.75.

Genius and Creative Intelligence. By Dr. N. D. M. Hirsch. Sci-Art Publishers. Pp. 339. Price $4.50.

Children's Behavior Problems. By Luton Ackerson. University of Chicago Press, 1931. Pp. xxi+268. Price $4.00.

Identification and Analysis of Attribute-Cluster-Blocs. By Herman C. Beyle. University of Chicago Press, 1931. Pp. xiv+249. Price $3.00.

The Dissatisfied Worker. By V. E. Fisher and Joseph V. Hanna. The Macmillan Company, 1931. Pp. ix+260. Price $2.50.

A Handbook of Child Psychology. By John E. Anderson, Charlotte Bühler, Anna Freud, Arnold Gesell, Florence Goodenough, Leta S. Hollingworth, Susan Isaacs, Harold Ellis Jones, Mary Cover Jones, Vernon Jones, C. W. Kimmins, Heinrich Klüver, Kurt Lewin, Helen Marshall, Dorothea McCarthy, Margaret Mead, Joseph Peterson, Jean Piaget, Rudolf Pintner, Lewis M. Terman, Beth L. Wellman, Helen T. Woolley. Edited by Carl Murchison. Clark University Press, 1931. Pp. xii+711. Price $5.00.

Experimental Social Psychology. By Gardner Murphy and Lois Barclay Murphy. Harper and Brothers, 1931. Pp. 709. Price $3.50.

Personality and Will. By Francis Aveling. D. Appleton and Company. Pp. x+246. Price $2.00.

Institute for Child Guidance Studies. Selected Reprints. Edited by Lawson G. Lowrey, M.D. Commonwealth Fund, 1931. Pp. viii+290. Price $1.50.

Integrative Psychology. By William M. Marston and C. Daly King and Elizabeth H. Marston. Harcourt, Brace and Company, 1931. Pp. xii+558. Price $7.00.

Human Heredity. By Dr. Erwin Baur, Eugen Fischer, and Fritz Lenz. Translated by Eden and Cedar Paul. The Macmillan Company, 1931. Pp. 734. Price $8.00.

NOTE

Correction of Editorial Oversight

In the January, 1928, number, Vol. xxii, No. 4, the Journal published in its editorial section, with the permission of *The American Bar Association Journal*, the reprint of a short article by Miss Norma V. Scheidemann.

Through an oversight the article appeared without permission having been secured from Miss Scheidemann herself. She calls attention to the error in the following note, which we are glad to publish:

"I have just encountered my article, 'Why Has Psychology Failed to Make a Greater Contribution to Law', published in *The American Bar Association Journal*, January, 1927, reprinted as an editorial in The Journal of Abnormal and Social Psychology, Vol. 22, pp. 361–368, 1928, without acknowledging my authorship. Since this article, three full pages in length, was reproduced without my permission (which would have been granted gladly had it been asked) and without recognition of my authorship, I wish to correct the apparent editorial oversight."